United States Court of Appeals

for the Second Circuit

APPENDIX

76-7063

UNITED STATES COURT OF APPEALS

SECOND CIRCUIT

- x

Digitronics Corp., Now Amperex Electronic Corp.,

Plaintiff-Appellant-Appellee,

v.

The New York Racing Association, Inc., Automatic Totalisators (U.S.A.) LTD., Automatic Totalisators LTD., and Premier Equipment Proprietary LTD.,

Defendants-Appellees-Appellants.

- x

Docket No.

76-7063

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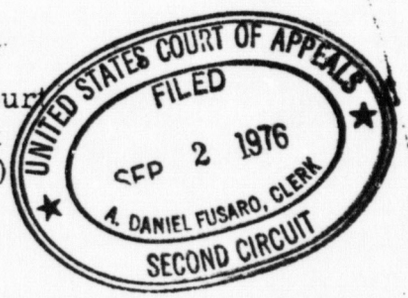

Appeal From the United States District Court
For the Eastern District of New York
(John F. Dooling, Jr., District Judge)

DEFERRED JOINT APPENDIX

Volume II, Pages A687-A1443

New York, N.Y.
September 2, 1976

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Wallace E. J. Collins

Counsel for Appellant

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New York, N.Y. 10016
212-986-1221

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DEFERRED JOINT APPENDIX

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6- IC Amount
19- BMA

Last 2- terminating upon approval

A687

A G R E E M E N T

AGREEMENT entered into this 30th day of July, 1964 between Automatic Totalisators Limited, having its head office at Nancarrow Avenue, Meadowbank, N.S.W., Australia ("Automatic"), and The New York Racing Association Inc., a New York corporation having its principal office at Ozone Park, Jamaica, New York ("NYRA").

W I T N E S S E T H:

WHEREAS, NYRA is engaged in the operation of thoroughbred horse racing tracks, with related parimutuel operations at Aqueduct and Belmont, Long Island, New York, and at Saratoga, New York; and

WHEREAS, NYRA desires to obtain totalisator equipment for use in the operations at each of said tracks; and

WHEREAS, Automatic has developed a system employing totalisator and electronic computer equipment designed for use at said tracks, said equipment (herein called the "Equipment") and the operation thereof being more fully described in the "Description of Equipment" attached hereto as Schedule A, the major items making up said Equipment being listed and itemized in Exhibits 1 and 2 to said

Schedule A; and

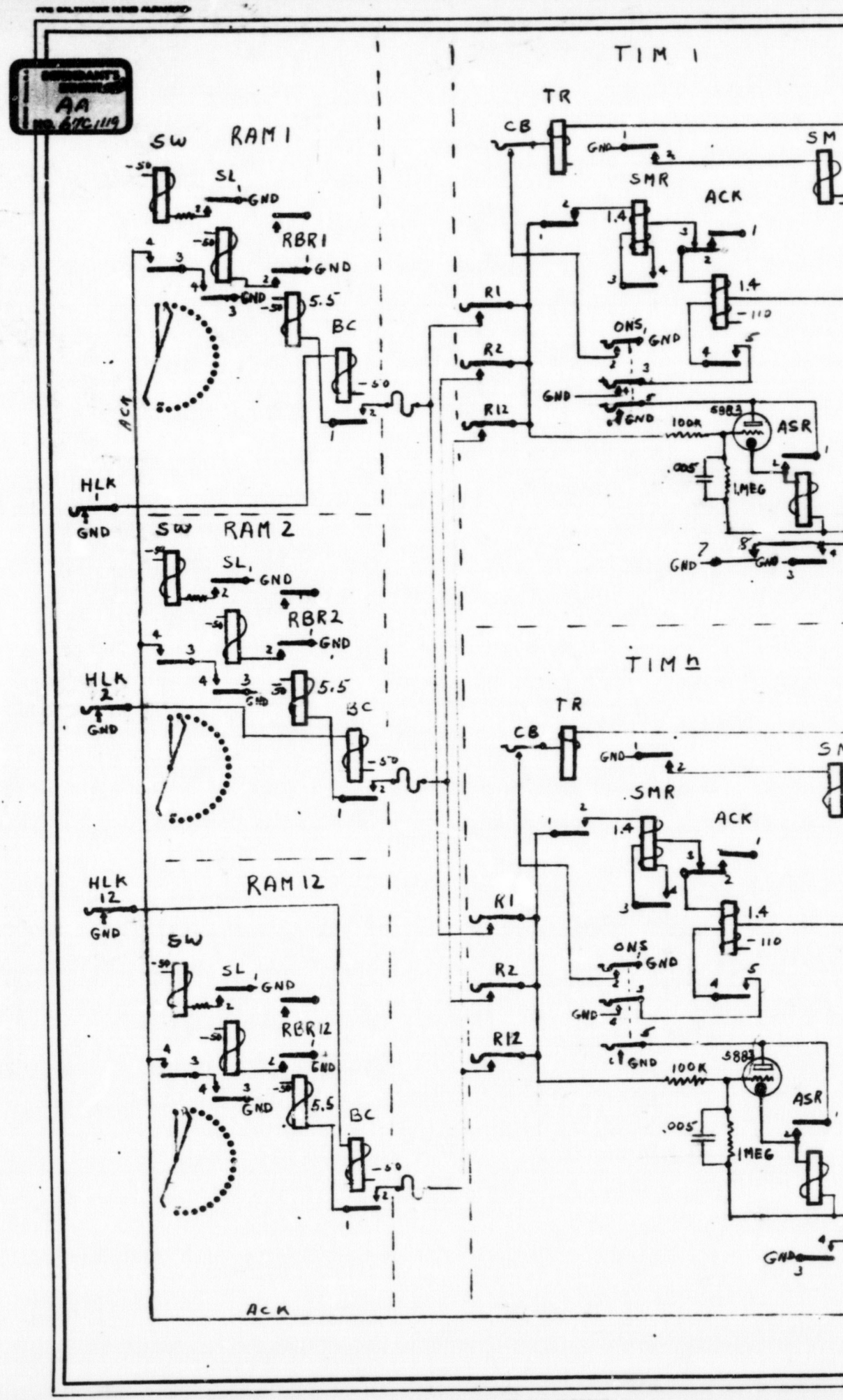
WHEREAS, Automatic is willing to provide the Equipment and NYRA is willing to pay for the same on the terms and conditions hereinafter set forth.

NOW, THEREFORE, in consideration of the foregoing and the mutual covenants herein contained, it is hereby agreed as follows:

1. Automatic represents and warrants to NYRA that:

(a) the Equipment, and the system including same, will when installed perform the operations with the speed, flexibility and safety described in Schedule A;

(b) the Equipment as a whole will operate efficiently and without interruption during each race betting interval on all racing days at any of the NYRA tracks for the entire period of the lease arrangement provided for in paragraph 3 below; provided, however, it shall not be deemed a breach of the foregoing representation and warranty if the efficient operation of the system is interrupted for less than five minutes on any one racing day or if any interruption of the function of any component part or unit of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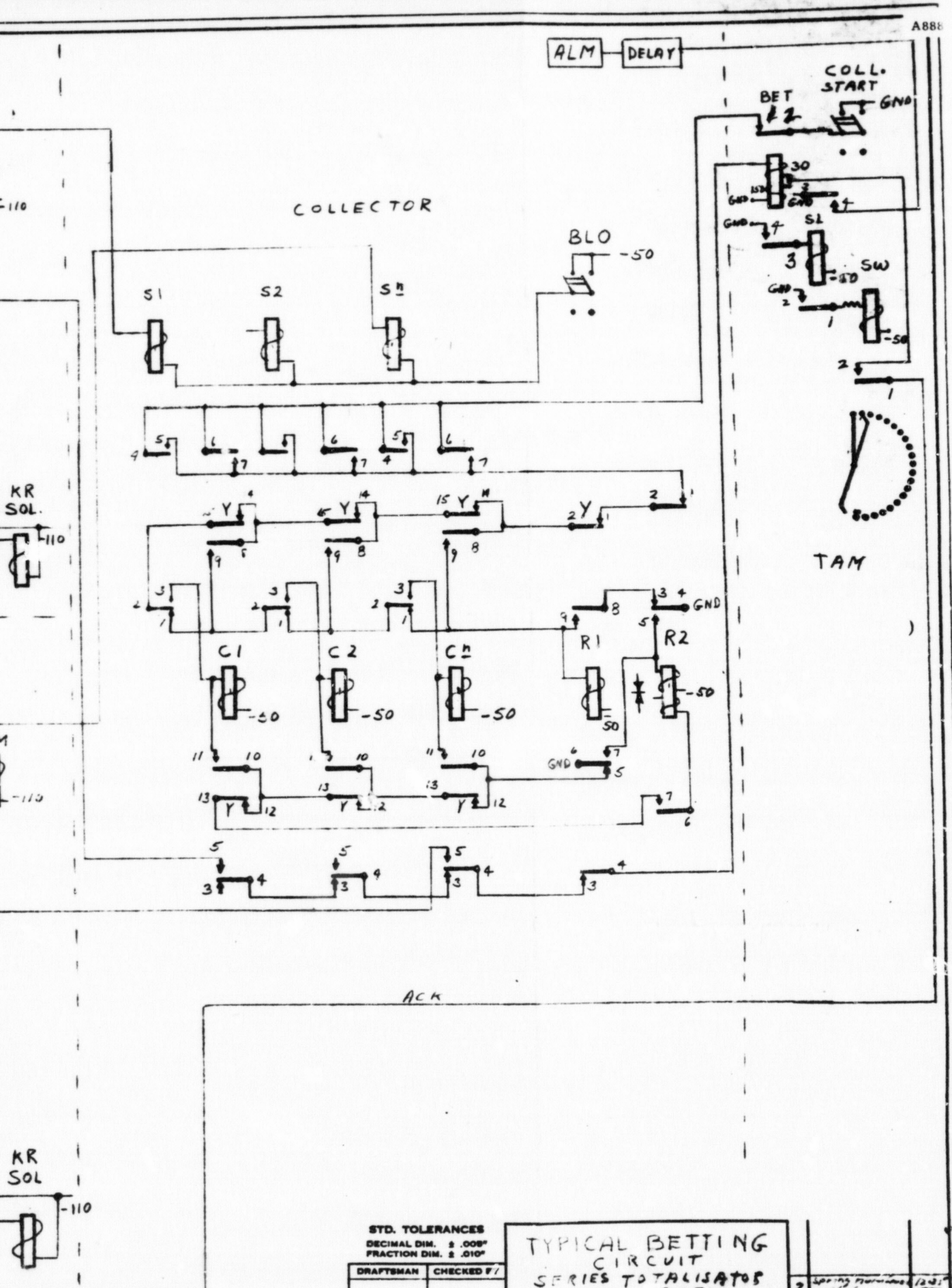

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the system takes place which does not prevent the efficient operation of the system on any racing day or if not more than 5 per cent of the ticket issuing machines in use at any particular track fail to operate at any one time on any one racing day, or if the failure of the system to operate efficiently and without interruption shall be due to or result from fire, strike, boycott, or any industrial disturbance, riot, civil commotion, theft, flood, lightning, tempest, storm, Acts of God, war, acts of war and defense or interference by any government or governmental agency, or the fault or failure of performance of NYRA, its agents or employees, or any other acts not within the control of Automatic or its assignees or subcontractors and/or its or their employees.

(c) the Equipment with the exception only of cables and the items listed as Fixed Equipment in Exhibit 1 of Schedule A is fully portable and can readily be transported and installed for use at each of the NYRA tracks;

(d) NYRA shall acquire upon the payment of the full purchase price provided for in paragraph 4 hereof good and clear title to the Equipment being

purchased by NYRA hereunder free and clear of all liens and encumbrances; and

(e) the Equipment shall be free from defects in workmanship and material under normal use and service.

Although the Equipment listed in Exhibit 2 of Schedule A is described by reference to items of equipment of Honeywell, Inc. it is understood that other equipment may be substituted therefor by Automatic provided NYRA approves of the manufacturer and provided the operation of the system as described in Schedule A is not adversely affected.

2. NYRA and Automatic each represent to the other that it has the power to enter into and perform this Agreement, that the execution and performance of this Agreement has been duly authorized by it by all necessary corporate action. Each further represents that, subject to completion of the trial hereinafter referred to and the obtaining of the required approval of the New York State Tax Commission and New York State Racing Commission as more fully set forth in paragraph 5 hereof, it has the power to perform this Agreement and that the execution and performance of this Agreement by it will not constitute a breach of any provision of its charter or of any agreement to which it is a party.

3. On the basis of the representations and warranties and subject to the conditions herein set forth, Automatic agrees to sell, deliver and install in space provided by NYRA at Aqueduct all of the Equipment listed and described in Exhibit 1 of Schedule A other than certain of the Fixed Equipment specifically designated therein which is to be sold, delivered and installed by Automatic in space provided by NYRA at its tracks at Belmont and Saratoga, respectively. In addition, Automatic will lease or arrange for the leasing to NYRA and will install or cause to be installed at Aqueduct and connect with the Equipment to be installed at Aqueduct as above set forth the electronic computer and related equipment listed and described in Exhibit 2 of Schedule A, the terms of the lease to be as set forth in Schedule B hereto.

The delivery and installation of the Equipment at Aqueduct shall be completed in sufficient time to enable it to be tested and available for operation prior to the commencement of the 1966 racing season at Aqueduct. All Equipment other than Fixed Equipment for Belmont and the third and fourth computers shall be delivered not later than December 20, 1965, the third computer shall be delivered on January 1, 1966, the installation of Equipment at Aqueduct

and Fixed Equipment at Saratoga shall be completed not later than February 1, 1966, the fourth computer shall be delivered on March 1, 1966 to Belmont or Saratoga and Fixed Equipment at Belmont shall be completely installed within 45 days after NYRA gives written notice to Automatic that the facilities at that track are ready for such installation or by March 15, 1966, whichever is later.

If Automatic shall fail to install the Equipment within 7 days after the dates provided therefor in this paragraph 3, Automatic will, unless NYRA shall elect to terminate this Agreement as permitted under paragraph 6, pay to NYRA a penalty in the amount of $10,000 per day for each day after the dates provided for such installation during which such installation is delayed, excluding, however, days during which the delay resulted from causes for which Automatic is not liable under paragraph 8, provided that such penalty shall not exceed $350,000. Such penalty shall be without prejudice to any other rights and remedies of NYRA.

4. NYRA shall pay to Automatic as a purchase price for the Equipment (other than the leased Equipment listed in Exhibit 2 of Schedule A), a total amount of $3,850,602 of which $300,000 represents the cost of installation of the

Fixed Equipment (including cables) for Aqueduct, $300,000 represents the cost of installation of Fixed Equipment (including cables) for Belmont and $240,000 represents the cost of installation of Fixed Equipment (including cables) for Saratoga. Said prices include all costs of packing, freight, insurance, customs duties, unloading charges, storage charges, manufacturer's excise taxes and costs of delivery to and installation at the track, but do not include New York City sales taxes or New York City compensating use taxes, which shall be borne by NYRA. Further, said prices do not include the following work and materials which are to be supplied by NYRA under the supervision of Automatic:

(a) cost of laborers to assist Automatic's engineers in digging cable trenches, laying cables and filling trenches;

(b) cost of providing the space for the Equipment and equipment to provide 25 tons of air conditioning at each track;

(c) cost of providing benches for the Ticket Issuing Machines;

(d) cost of connecting power equipment supplied by Automatic to the main lines of the utilities, and

(e) cost of installation and termination of the A. C. Supply and Distribution in light box indicators.

NYRA shall have the option of acquiring from other sources new cable required for installation by Automatic pursuant to specifications to be supplied by Automatic within 30 days from the signing of this Agreement. If the cable is so acquired by NYRA for Aqueduct or Belmont and delivered prior to September 30, 1965, the above purchase price for the Equipment shall be reduced by $80,000 (if for both - $160,000). If the cable required for use at Saratoga is acquired by NYRA and delivered prior to September 30, 1965, the above purchase price shall be reduced by $48,000.

Of the total purchase price, $250,000 shall be paid by NYRA to Automatic upon delivery to NYRA of the bond provided for in paragraph 12 hereof. Thereafter NYRA shall pay to Automatic monthly five days after demand therefor 90% of the dollar amount certified by Automatic to represent that portion of the total purchase price attributable to the ticket issuing machines and related Equipment theretofore shipped under this Agreement and to the other items of equipment and materials theretofore delivered and to services theretofore rendered pursuant to this Agreement, to the

extent not theretofore covered by payments (other than the initial $250,000 payment) by NYRA; provided, however, that Automatic's demand for payment shall in each case be accompanied by a certificate signed by an authorized officer of Automatic setting forth:

(i) an itemized description of the work or materials upon which the demand is based, with such supporting evidence as Arthur Young & Co. may require;

(ii) that any items of Equipment to which such certificate relates have been shipped or delivered pursuant to the terms of this Agreement;

(iii) that none of such work or materials has been included in any prior certificate hereunder; and

(iv) that Automatic is not in default in the performance of any of its obligations hereunder;

countersigned by NYRA's accountants, Arthur Young & Co., as to items (i), (ii) and (iii), provided, however, that after payment shall have been made by NYRA of amounts aggregating 75% of the total purchase price, no further payment shall be made unless and until the approvals provided for in paragraph 5 shall have been obtained and all the Equipment, other than Fixed Equipment for Belmont, shall have been shipped or delivered pursuant to the terms of this Agreement; and provided further that after payment shall have been made by

NYRA on account of the purchase price of the Equipment and installation costs at a particular track of amounts aggregating 90% of the total purchase price attributable to such track no further payment shall be made on account of Equipment and installation costs at such track until 30 days following completion of installation of all Equipment (including leased Equipment) at such track. At the expiration of such 30 days the entire balance of the purchase price attributable to such track shall be paid by NYRA. Items of Equipment or service not specifically allocated to a track shall be deemed to be attributable to Aqueduct.

5. Under the provisions of Section 6 of the Pari-Mutuel Revenue Law (Chapter 254 of the Laws of 1940, as amended), McK. Unconsol. Laws Section 7956, prior to the use of the Equipment it must be approved by the State Racing Commission and the State Tax Commission. NYRA and Automatic shall use their best efforts to obtain such approvals. In order to permit the obtaining of such approvals in time to permit the installation of the Equipment by the date provided for in paragraph 3 hereof Automatic agrees that it will:

(a) Deliver or cause to be delivered to the plant of Data Trends, Inc., Parsippany, New Jersey, no later than June 1, 1965, twenty of the required ticket

issuing machines, and two of the computers with associated equipment;

(b) Not later than July 1, 1965, have the Equipment ready at said Parsippany, New Jersey plant to undergo the testing of a simulated daily double pool described in the State Tax Commission's letter dated June 29, 1964, a copy of which has been furnished to Automatic and so advise NYRA in writing;

(c) Complete successfully not later than July 20, 1965 the tests referred to in sub-paragraph (b) above and cooperate with NYRA in obtaining authority from the State Racing Commission and the State Tax Commission to conduct a trial (as described in the said letter from the State Tax Commission) of the Equipment during the 1965 meeting at Saratoga;

(d) Assuming the completion of such tests successfully and the receipt of such authority, deliver or cause to be delivered and install or cause to be installed at NYRA's Saratoga Track not later than August 1, 1965 (or such earlier date as may be required in order to permit the carrying out of such trial for a period of not more than twenty days beginning on August 4, 1965) not less than 65 of the ticket issuing machines and two of the computers with the associated equipment; NYRA shall reimburse Auto-

matic for all its out-of-pocket expenses incurred directly in connection with the transportation of the Equipment (other than Fixed Equipment) from New York to Saratoga and from Saratoga to New York and the trial at Saratoga, including without limitation salaries and wages of Automatic's engineers and technicians participating in the trial at Saratoga and reasonable per diem allowances and travel allowances for such persons, which expenses shall not exceed $4,500.

(e) Assuming that following such trial period at Saratoga the necessary approvals are not obtained but that the provisions of sub-paragraphs (a), (b) and (c) above have been complied with, Automatic shall have the option, upon notice given on or before the last day of such Meeting, to make such changes and adjustments in the system and Equipment as may in its opinion be required in order to obtain such approval, provided that such changes do not involve any increase in rental or purchase price and that the representations and warranties of Automatic shall apply to the Equipment and system as so changed. In such event Automatic will, not later than

September 30, 1965, deliver or cause to be delivered and install or cause to be installed at the Aqueduct Track not less than 125 of the ticket issuing machines and 2 of the computers with associated equipment and will advise NYRA that a further trial may be conducted at any time. NYRA shall reimburse Automatic for all its out-of-pocket expenses incurred directly in connection with such trial at Aqueduct, including without limitation salaries and wages of engineers and technicians participating in the trial, which expenses shall not, however, exceed $9,000.

6. It is recognized by the parties that time is of the essence in the performance of this Agreement. If Automatic, for any reason other than the fault of NYRA, shall fail to meet any of the requirements of subparagraphs (a) through (d) of paragraph 5 hereof by the dates indicated therefor, or if the approval of the State Racing Commission or the State Tax Commission is not obtained after the trial referred to in said subparagraph (d) provided in the latter case that Automatic shall not have duly requested an opportunity to change the system and Equipment in compliance with subparagraph (e) of paragraph 5, or if any deliveries or installations are not completed on or prior to the dates

specified in paragraph 3 hereof, then NYRA may at any time within seven days of such failure give notice of termination of this Agreement.

If (i) this Agreement shall be terminated by NYRA as provided in this paragraph 6, (ii) Automatic shall not have completed the installation described in subparagraph (e) of paragraph 5 and advised NYRA by September 30, 1965 that a further trial of the system and Equipment may be conducted, or (iii) the approval of the State Racing Commission and the State Tax Commission shall not have been obtained prior to October 31, 1965, then in any such event all payments made by NYRA under this Agreement prior to such termination or date, as the case may be, other than payments made by NYRA on account of rental of a second computer and related equipment for the month of June, 1965 shall, without any further notice or demand, be refunded forthwith, NYRA shall redeliver possession of the Equipment to Automatic and Automatic shall cause the Equipment to be removed from the premises of NYRA and shall cause the premises to be restored to their former condition, all at the expense of Automatic. In addition, in such event Automatic shall pay to NYRA any direct out-of-pocket costs NYRA may have incurred in connection with this Agreement, including any amounts

paid by NYRA to the State of New York pursuant to the provisions of the condition in paragraph 3 (but not the conditions in paragraphs 4 and 5) on page 3 of the State Tax Commission letter of June 29, 1964 or any substitute condition subsequently imposed by said Commission in connection with the testing and trial of all or any part of the Equipment and agreed to by Automatic, such out-of-pocket expenses (other than any such payments to the State of New York) not to exceed $100,000. NYRA shall use its best efforts to have its present equipment also available for operation during the testing of the Equipment at either track.

7. For a period of twelve years from the date hereof, Automatic shall notify NYRA promptly in writing, from time to time, of improvements in the Equipment (other than leased Equipment which is dealt with in Schedule B) and at the request of NYRA will, from time to time, cause modifications and changes to be made in Equipment (other than leased Equipment) to reflect such improvements, the charges to be paid by NYRA for such modifications and changes and the installation thereof to be the cost thereof to Automatic, plus ten percent. For a period of eight years from February 1, 1966, or the termination of the maintenance and service arrangement (Schedule C hereto), whichever is shorter, Automatic will provide, without additional cost to NYRA, replacement parts required, whether

for reasons of ordinary wear and tear or otherwise (except for the negligence of NYRA, its employees or agents or for damage or loss due to causes beyond the control of Automatic, or its assignees or subcontractors), to maintain the Equipment (other than leased Equipment) in good and efficient operating condition. All other replacements required shall be made by Automatic at cost plus 10%. General maintenance service shall be provided by Automatic on the terms and conditions set forth in Schedule C hereto.

8. Without affecting any of NYRA's rights of termination under paragraph 6 above (including rights to refunds and payments as provided therein), Automatic shall not be liable for any delays in the manufacturing, shipping, delivering, or installation of any of the Equipment caused by fire, strike, boycott, or any industrial disturbance, riot, civil commotion, theft, flood, lightning, tempest, storm, Acts of God, war, acts of war and defense or interference by any government or governmental agency, or fault or failure of performance of NYRA, its agents or employees, or any other acts not within the control of Automatic or its assignees or subcontractors and/or its or their employees.

9. Automatic undertakes to indemnify NYRA against any claim, suit or proceeding based on an allegation that the Equipment or any portion thereof or the use thereof as

contemplated by this Agreement constitutes an infringement of any patent, provided Automatic is notified promptly of the institution of any such action or assertion of any such claim. Automatic shall defend or assist in the defense of any such suit or proceeding instituted against NYRA and shall pay all damages and costs awarded therein. If the use of any Equipment or part thereof is enjoined in any such proceeding, Automatic shall, at its expense, either procure for NYRA the right to continue to use such Equipment or part thereof or, with the consent of NYRA, modify it so that it becomes non-infringing.

10. Automatic shall have the right to assign to others the right to provide the Equipment which is to be leased as provided in Schedule B hereto and may also assign to others the performance of the services set forth in Schedule C hereto; provided that in each case the assignee shall execute in favor of NYRA the warranty and representation set forth in paragraph 1 hereof; provided further that the assignee, other than a wholly owned United States subsidiary of Automatic, shall be in each case satisfactory to NYRA, and provided further that Automatic shall in each case continue to be responsible for the performance by the assignee of all of the obligations under

said Schedules B and C No direct or indirect assignment of this Agreement by Automatic, other than as specifically provided in this paragraph, may be made without the prior written consent of NYRA.

11. Automatic shall hold NYRA harmless against any loss, damage or liability resulting from the acts of persons employed or retained by it to perform any of the installation or other services herein. Automatic shall, at its own expense, secure and maintain such insurance as will protect it from claims under workmen's compensation acts and other employee benefits acts; from claims for damages because of bodily injury, including death, to Automatic's employees and all others; and from claims for damages to property. The foregoing insurance shall apply to any and all such claims which may arise out of or result from Automatic's operations under this Agreement whether such operations be by itself or by any subcontractor or anyone directly or indirectly employed by them.

This insurance shall be written for not less than the following limits:

Workmen's Compensation and Other Employee Benefits Acts - as required by law

Public Liability
  Bodily Injury
    $100,000 each person
    $300,000 each occurrence

  Property Damage
    $100,000 each accident

Automobile Liability
  Bodily Injury
    $100,000 each person
    $300,000 each accident

  Property Damage
    $100,000 each accident

Certificates evidencing such insurance shall be filed with NYRA prior to the start of any work called for under this Agreement. Each certificate shall provide that the policy shall not be changed or cancelled until ten (10) days' written notice has been given to NYRA.

12. To insure that the obligations on the part of Automatic under this Agreement are performed, Automatic is executing and delivering to NYRA promptly following the execution of this Agreement a surety and performance bond in favor of NYRA and satisfactory to it in the amount of $3,850,602 one of the conditions of which is that all refunds, payments and removals shall be duly accomplished by Automatic. Premiums for such bond shall be borne by NYRA.

13. All questions and controversies arising in connection with this Agreement shall be submitted to arbitration in the City of New York in accordance with the rules of arbitration of the American Arbitration Association.

14. It is hereby agreed that this Agreement and any question arising hereunder shall be determined in accordance with the laws of the State of New York. Automatic hereby constitutes and appoints any partner of the law firm Liebman, Eulau and Robinson, 32 East 57th Street, New York, New York, as its agent upon whom process may be served in any suit, and notices and demands may be served in any arbitration, arising out of this Agreement, including the performance and interpretation hereof. Without limiting the generality of the foregoing, NYRA agrees to notify Automatic in writing upon the commencement of any suit or arbitration proceedings by the service of process upon said agent. Automatic shall have the right to substitute another person, firm or corporation with offices in the City of New York as its agent under this paragraph 14, such appointment to be made by the delivery to and receipt by NYRA of a designation of such new agent duly executed and acknowledged by an officer of Automatic.

15. Except as provided in paragraph 14 above, any

notice required or permitted to be given hereunder shall be deemed to have been given when sent by certified air mail addressed in the case of NYRA to P.O. Box 90, Ozone Park, Jamaica, New York, and in the case of Automatic to Nancarrow Avenue, Meadowbank, N.S.W., Australia.

16. The terms "this Agreement," "hereunder" and "herein" shall be deemed, unless the context otherwise requires, to include not only this instrument itself but also Schedules A, B and C.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed and delivered the day and year first above written.

THE NEW YORK RACING ASSOCIATION INC.

By _____

AUTOMATIC TOTALISATORS LIMITED

By _____

A708

SCHEDULE A

To Agreement dated as of July 30, 1964
between the New York Racing Association Inc. (NYRA) and Automatic Totalisators Limited (Automatic)
and agreement dated as of July 30, 1964 18
between Automatic and Honeywell.

Description of Equipment

Integration Equipment

The Integration Equipment consists of twelve (12) " J 11 Scanners" plus one spare and two "Master Scanners" plus one spare whi serve to connect the 550 or more J 11 Machines (J 11s) to the Central Computers. (See Figure II-I)

Each of the J 11 Scanners controls a group of up to fifty (J 11s which are connected to a common multi-wire cable. The J 11 Scanner continuously checks each of the fifty J 11s in turn to see if it needs servicing.

As the J 11 Scanner scans across its fifty J 11s, it permit any J 11 to obtain servicing by activating its BID line. When this occurs, the J 11 Scanner stops scanning, locks on to the J 11 request ing attention and sends it a "Connect" signal. This action causes th selected J 11 to be connected to the multi-wire cable and through the J 11 Scanner to the Master Scanner and hence ready for computer servicing.

When the Master Scanner finds a J 11 Scanner with a "Biddin J 11, it stops scanning, locks on to the J 11 Scanner and connects it through to the computer. The computer services the J 11 in approximately 800 microseconds and initiates a "Confirm" signal to the J 11. Following receipt of this signal by the J 11, the Master Scanner and the J 11 Scanner then continue their scanning cycles while the J 11 issues the ticket.

All the Scanner equipment will be located centrally near the computer equipment. This arrangement guarantees an optimal maintenance environment and permits rapid corrective action. The spare J 11 Scanner supplied can be plugged in to replace any of the twelve on-line Scanners in a few minutes. In the rare event of a malfunction of the simpler Master Scanner, its modular plug-in design permits quick corrective action and early return to service. During any such period, the stand-by Master Scanner would provide full operation of the system.

Central Computer Control

The Central Computer Control consists of a total of three general purpose digital computers. All three computers are the identical type, specifically the Honeywell H-200 computer. This advanced machine is entirely solid state and includes a high speed central processor with core storage and permits a full complement of peripheral equipment.

Two of the three computers are used for the on-line tote system. Each machine is fully capable of handling the entire peak load. In normal operation, two independent computer systems are fully on-line, both receiving all data from the J 11s. One system actually controls the full tote operation, with the second system continuously operating in parallel and ready to take over at an instant's notice. Concerning reliability, if one of the two on-line systems should become disabled during the racing hours, then the third system takes the place of the disabled computer. One of the computer systems will be permanently located at Aqueduct. In this way, there are always two full computer systems functioning simultaneously for the critical on-line computing functions.

A fourth independent computer system will be located at Belmont, except during the Saratoga meet, when it will be located at Saratoga. Under this approach, only two computer systems will be moved after the close of one meeting and before the opening of the next meeting. In this way, at least one computer system will always be installed, checked out, and in operating condition well before the opening of every meeting.

In addition to operating reliability, a substantial improvement in vulnerability protection is provided by the availability of the third and fourth computer systems. By vulnerability is meant protection against occurrences such as shipping damage during the move to Belmont or Saratoga, or physical damage of any kind, even in its normal location due to totally unpredictable and accidental actions.

Referring now to Figure II-2, notice the configuration of each of the three computer complexes. All three computers have the Central Processor, a Console, two Peripheral Adapters and a Memory Adapter Unit. In addition, each machine has two magnetic tapes with Computer C having three tapes to allow for the usual pari-mutuel data processing requirements, plus a Card Reader and Punch. Finally, Machines A, B and C also have printers. The purpose of these printers which print at 650 lines per minute, is to give a print-out of all the J 11 Machines' statistics after each race. This print-out provides a full and complete record in case of any malfunction of the machines or system and can be used for an audit trail and accounting control purposes.

Indicator Boards

The Indicator Board complex is comprised of two parts. First are the actual boards which consist of the Infield Board to show all the information displayed by NYRA's existing board.

Briefly, the information displayed will be as follows:

1. Win, Place and Show Pool totals
2. Win Odds (2 sets)
3. All Prices - including Dead Heat Position (2 sets)
4. Results - showing four (4) places (2 sets)
5. Miscellaneous information such as Race Number, Post Time, Time-of-Day, Minutes-to-Post, etc.

Inside auxiliary odds indicators are provided consisting of five (5) Double-faced and three (3) Single-faced Boards. In addition a Miniature Indicator Board is provided in the central location to permit local monitoring as well as television camera viewing.

The second part is the board control equipment which drives the Board Indicators in accordance with the signals it receives from the computer. All information displayed on the Indicator Boards is verified by a return signal which is checked by the computer.

All boards are driven from a common control so that any given item of information will be identical on all boards. Two complete Board Control Units are provided to maintain the high reliability of the total system. Provision is included for manual operation of the boards to allow for the "morning line" and any other manual changes desired.

Track Control Console

In keeping with the vulnerability protection principle four Track Control Consoles and three Master Scanners are provided. The purpose of the Track Control Console is to provide a single operating point for operation of the track.

The consoles are set up for maximum clarity and familiarity to the operator. Switches and indicators are grouped and labeled so as to be most efficient for normal track usage.

The Track Control Console provides an integration of the computer input/output typewriter plus a custom designed switch and indicator panel. In this way the flexibility of computer control is achieved while maintaining the efficiency and simplicity of specialized panel layout.

Supplementary Equipment

In addition to the major components listed above, additional equipment of a supplementary nature will also be supplied. Within this category are the power supply equipments necessary to operate the J 11 machines and the indicator boards. (The power supplies required for the computer and integration equipment are self-contained.)

Also included is an engine generator set sufficient to run the computer system, plus J 11s, plus up to eight interior boards, plus air conditioning for three computers, in case of failure of the main commercial power feeds. This unit will operate on-line and assume the system load without effect on system operation in the event of failure of the commercial power feeds.

Included in this category is the entire cable system which interconnects the J 11s and the indicator boards to the central equipment. This cable system is supplied with full terminating facilities in the central location. This terminating facility permits flexibility in interconnecting the J 11s and boards and reassigning of J 11s to new locations. In addition, it serves as a central maintenance point for isolation and detection of any cable damage which might occur.

System Operation

A. Track Control

Control of the track in connection with the entire tote system is accomplished at the Track Control Console. This position is intended to be the nerve center of the system and will normally be handled by the person directly responsible for correct operation of the tote system.

As noted earlier, the Console provides indicators and controls for all of the primary actions required and in addition provides access to the computer complex to allow the interrogation of a broad range of information and status of the betting, odds, cash positions, etc.

Specifically, the Track Control Console is used to:

1. Modify the "Morning Line" odds for each race if necessary.
2. Indicate the starting horses in the race.
3. Set the Race Number and Code for each and every J 11 Machine.
4. Open the betting for each race.
5. Set up the Post Time, Minutes-To-Go.
6. Scratch entries if required and call for recalculation of the odds.
7. Close the betting for each race.
8. Enter results of the race.
9. Request new payoff calculation in case of disqualification action.

10. Monitor the Miniature Indicator Board and take appropriate action if required.

In addition to the above actions, the computer access to the Track Control Console permits automatic printout of status and alarm information under program control. This feature is particularly valuable since, as a result of experience with the system, additional items can be easily programmed to improve overall performance. This inherent "learning" capability permits the entire tote system to be kept to or ahead of changing conditions and requirements.

System Procedures and Audit Controls

The following descriptions of actions, audit controls, and results produced during the normal totalisator transactions are illustrative of the proposed system:

1. J 11 Transaction (Selection, Checking, and Printing of a Ticket).

Between the request for a ticket by a customer, and the issuing of that ticket, the following steps take place:

(a) The J 11 operator depresses the key for the horse number requested. (The Win, Place, or Show key would already by locked in a depressed condition, under the present scheme of restricting each J 11 to one pool. If this scheme changes, then the Win, Place or Show key would be depressed for each transaction following the horse number.) For a daily double transaction, the horse number for the second race is keyed in after that for the first race.

(b) A request signal goes to the J 11 Scanner, which in turn signals the Master Scanner. When the Master Scanner has closed the circuit to the computer, a five-character input item is transferred to the computer from the J 11 (each character having six bits or less):

1st character:	Horse number, plus a parity bit.
2nd character:	Horse number, plus a parity bit (for the second horse in a daily double - otherwise, this character is blank).
3rd character:	Type of denomination, type of pool, and a parity bit.
4th and 5th characters:	J 11 identification number.

(c) After receiving the transaction, the computer performs the following verifications, which will take approximately 8/10,000 of a second:

(1) The horse number(s) are checked against being scratched or not entered, and parity is checked.

(2) The J 11 identification number is used to enter a table which has the type of denomination and type of pool for each J 11 in a format similar to that of the 3rd character of the transaction. An equality test of these two characters checks the parity of the 3rd character, and serves as a semi-verification of the J 11 identification number.

(d) If any of the above verifications fail, a "reject" signal is sent to the J 11, and its key(s) are released without a ticket being issued. (Depending on the type of error, there may be an alarm and/or a printout on the Track Control Console, allowing the Console operator to take the necessary action.) If none of the above verifications fail, a "confirm" signal is sent to the J 11, and its key(s) are released while the ticket is printed and issued.

(e) While the description of what takes place is long, the actual time span involved is very short. From the moment the transaction leaves the J 11 until a reject or confirm signal is received at the J 11, not more than approximately 8/10,000 of a second will have elapsed. The computer can thus verify transactions from all 550 J 11s in (550 X 8 = 4,400) approximately 4,400/10,000 or less than half a second on an instantaneous basis. Therefore, on a peak basis, each and every J 11 may be issuing tickets at the rate of two per second without overloading the capacity of the computer to verify the transactions.

2. Creation of a History Tape.

After sending a confirm signal, the computer goes through a number of steps to reflect the effect of that transaction on the pool totals and odds to be displayed:

(a) The counter for the number of tickets sold by that J 11 is incremented.

(b) The appropriate pool total for that horse is added to.

(c) The J 11 identification number is transferred to one of twelve temporary storage locations depending upon the horse number.

(d) Daily double bets cause the J 11 identification number and horse number of the second race, to be transferred to one of another twelve temporary storage locations, depending on the horse number in the first race.

(e) Whenever necessary, a temporary storage block is written on to magnetic tape to make room for more transactions.

3. Calculation and Display of Pool Totals and Odds.

Every 90 seconds (or at whatever interval may be desired), a signal is sent to the computer to update the display on the infield board. (The board will also be changed immediately after a late scratch.) The following steps are taken:

(a) The individual pools for each horse are summed to get the total pools, and the net pools are determined by subtracting 15% from the total pools.

(b) The net pools are divided in turn by the appropriate individual pools, and the standard odds chosen are those which are less than or equal to the exact odds.

(c) The odds and pool totals information is sent to the display board, a field (6 characters or less) at a time. The field, after being displayed is immediately read back to the computer and compared to insure that the display is correct.

4. End of Betting Procedures.

(a) Upon a signal being entered from the judges console, the scanners are stopped and the betting for that race closes.

(b) The history tape is completed, after all transactions have been serviced. It is then backspaced to the first block with information for this race.

(c) The final display is sent out and checked.

(d) The cash total for each money room is printed out, for comparison against the totals which were determined from the readings of the resettable J 11 counters located in each money room.

Thus, the electromechanical counters are checked against the electronic calculations of the computer.

(e) For each J 11, the following information may be printed:

(1) Total number of tickets sold.

(2) Total value of tickets sold.

(3) Cumulative number of tickets sold, matching the counter that is never reset, located on the J 11.

(4) Denomination, and whether Win, Place, Show, or combination, or Daily Double.

(5) Total number and value of tickets sold for each horse.

(f) The race number printing mechanism on each J 11 is advanced one, and then checked. Other checks, such as denomination and type of pool may be made.

(g) The pay-off calculations will be made for every horse and every race. The calculated pay-offs will be rounded off to the next lowest $.05 amount to obtain the actual pay-off amounts.

5. End of Race Procedures.

(a) The winning pay-offs are set-up, as soon as the order of finish is entered at the Track Control Console. They are displayed upon receipt of a signal that the results are official. "Breakage", which is the odd cents over any multiple of five, calculated on the basis of one dollar, otherwise payable to patron, is calculated at this time.

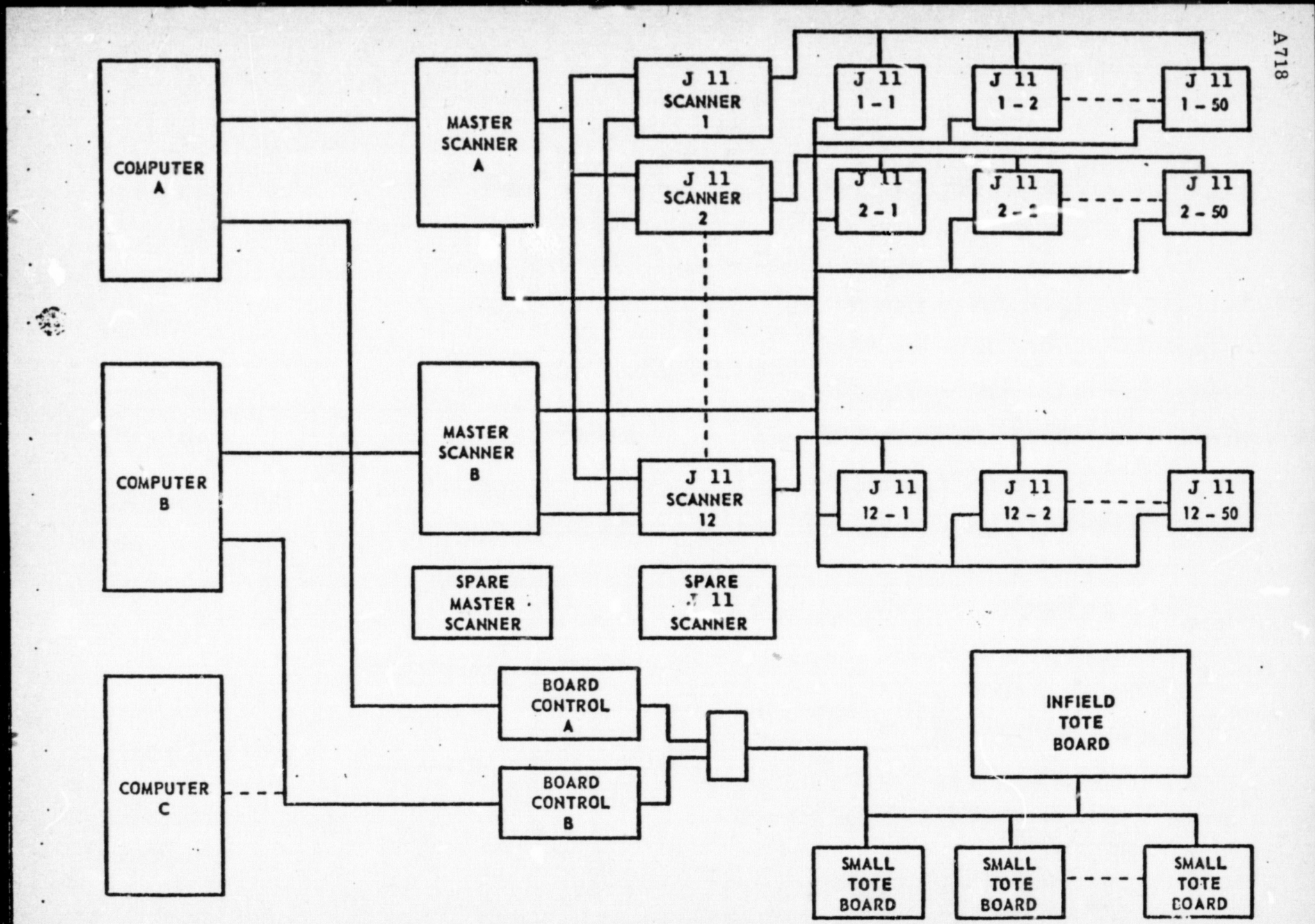
(b) The history tape is read, and for each horse finishing in the money the corresponding blocks are broken down by window number (which, in turn under the present scheme, can be broken down into the type of pool). The total $2 Win, $2 Place, etc. tickets are also calculated. A signal that the results are official will initiate the printing of the total of all the winning tickets by J 11 number, plus other required information. The listing can be complete three to five minutes after initiation.

(c) The blocks for the winning horse in the first race of the daily double are read from the history tape, and broken down into 12 temporary storage locations - one for each horse in the second race. This information is written back on to the tape after the last of the first race information. After the second race is run, the winning blocks are read again, broken down by J 11 number, and printed out.

Summary

The procedures, checks and balances outlined in this section appear to adequately satisfy the audit controls required. Should additional controls be desired or the system be extended to handle additional J 11s, Pools, Denominations or Displays, the systems concept is flexible enough to accept them with no degradation in service. In particular, the framework described above may be readily extended to handle Off-Track Betting, should the requirement arise in the future.

The possibility has been raised of adding an on-line machine recognition Ticket Validation function. This is considered entirely reasonable and in fact a substantial amount of work in this field has been accomplished by Automatic. Practical techniques have already been developed and it only remains to tailor these designs to the specific requirements of The New York Racing Association.



SYSTEM CONFIGURATION - FIGURE II - 1

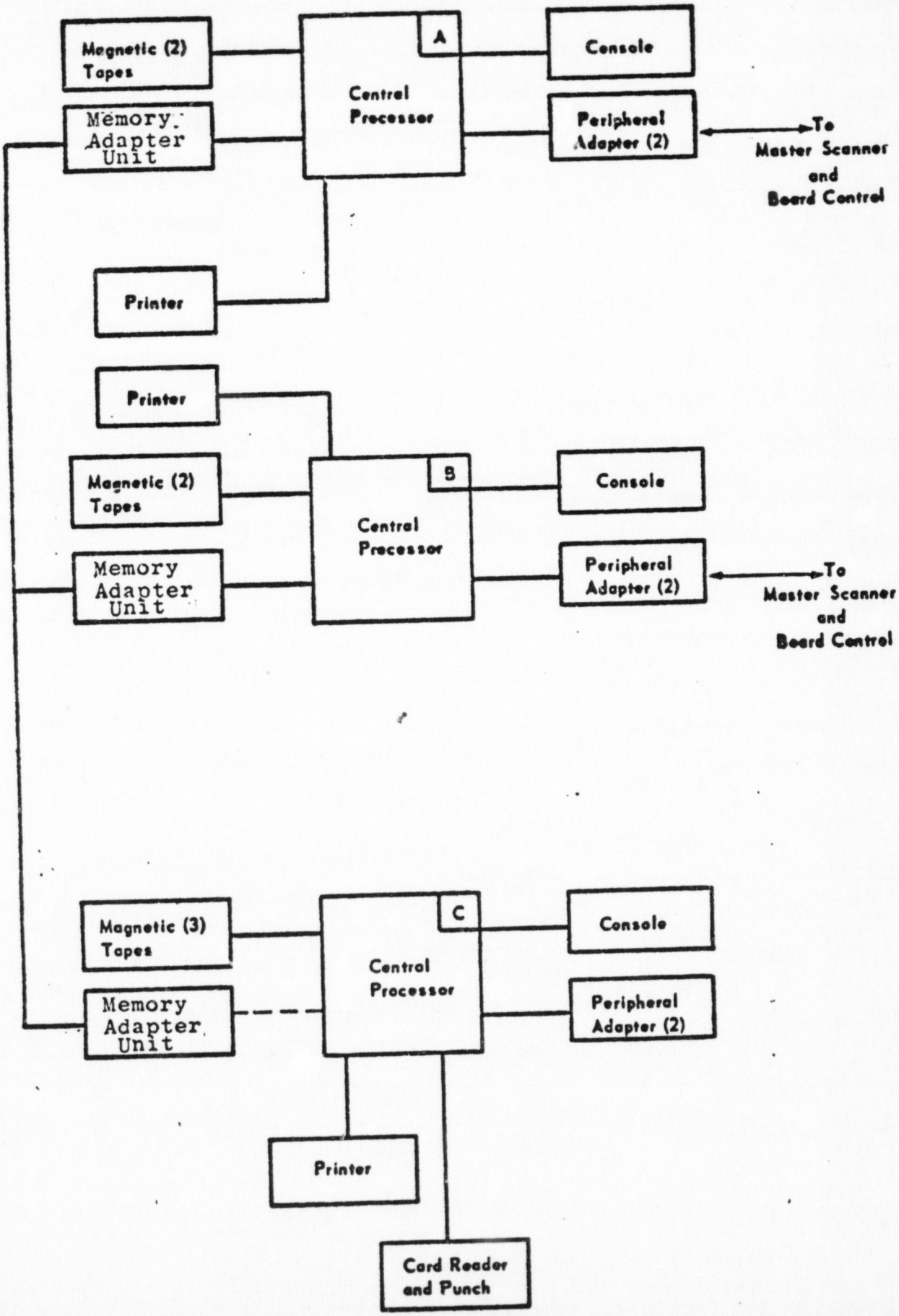

Magnetic (2) Tapes
Memory Adapter Unit
A
Central Processor
Console
Peripheral Adapter (2)
To Master Scanner and Board Control
Printer
Printer
Magnetic (2) Tapes
Memory Adapter Unit
B
Central Processor
Console
Peripheral Adapter (2)
To Master Scanner and Board Control
Magnetic (3) Tapes
Memory Adapter Unit
C
Central Processor
Console
Peripheral Adapter (2)
Printer
Card Reader and Punch

FIGURE II – 2

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PURCHASED EQUIPMENT

Portable Equipment (Aqueduct, Belmont, Saratoga)

1. 550 Win, Place, Show/Combination and Daily Double J 11 Machines
2. 550 Sets J 11 Machine Connecting Leads
3. 120 J 11 Machine Distribution Boards
4. 50 J 11 Machine Total Sales Register Trays
5. 6 Print-Out Consoles
6. 3 Master Scanners
7. 13 J 11 Scanners
8. 2 Board Controls
9. 2 Interface Panels
10. 89 3" Monitor Lamp Boxes
11. 1 Odds Isolation Relay Set
12. 1 Odds Selector Relay Set
13. 1 Prices and Results Selector Relay Set
14. 4 Track Control Consoles
15. 1 Judge's Console
16. 375 15" Lamp Boxes
17. 24 Odds Dash Boxes
18. 26 Dot Lamp Boxes
19. 2 Track Condition Signs
20. 6 Odds and Dash Selector Relay Sets
21. 12 Prices and Results Selector Relay Sets

Portable Equipment (cont'd)

22. 2 Signs (Objection), (Official)

23. 2 Signs (Deadheat), (Photo)

24. 442 Lamp Boxes - 9" or 6" as required

25. 156 Odds Dash Lamp Boxes

26. 26 Dot Lamp Boxes

27. 26 Odds Selector Relay Sets

28. 26 Odds Dash Selector Relay Sets

29. 1 Price and Result Desk

30. 1 Price Console

31. 1 Miscellaneous Console

32. 1 Set connecting leads

General (Fixed at Aqueduct)

Telephone -

33. 1 30-line telephone exchange to provide communication between central and each selling division and each indicator for the use of engineers and mechanics.

Television -

34. 1 closed circuit TV system to monitor the Infield Indicator Board

Cable -

35. Cables supplied and/or laid by Automatic will be sufficient to allow betting on all values on all pools in each selling division and to connect the Infield Indicator and 13 inside odds boards, as presently provided at Aqueduct.

Spares -

36. Spares sufficient in number in the opinion of Automatic to permit it to fulfill its obligation pursuant to the Agreement and Schedule C thereto.

PURCHASED EQUIPMENT

Fixed Equipment (Aqueduct)

37. 20 Selling Line J 11 Machine Connection Distribution Boards
38. 20 Selling Line Starter Annunciators
39. 550 Track Name and Value Slides
40. 6 Ticket Register Tray Modular Enclosures
41. 1 Central Cable Termination Board
42. 375 Sets of AC or DC Leads
43. 1 Circuit Breaker Panel
44. 10 AC Distribution Panels Without Relays
45. 14 AC Distribution Panels With Relays
46. 2 Odds Selector Relay Racks
47. 2 Results and Prices Selector Relay Racks
48. 1 Transformer
49. 442 Sets of AC and DC Leads
50. 13 AC Distribution Boards
51. 13 Powerstats
52. 2 50 volt 500 amp Rectifiers
53. 1 187.5 KVA Automatic Start Engine Generator

General (Fixed at Belmont)

Telephone -

54. 1 30-line telephone exchange to provide communication between central and each selling division and each indicator for the use of engineers and mechanics.

Television -

55. 1 closed circuit TV system to monitor the Infield Indicator Board.

Cable -

56. Cables supplied and/or laid by Automatic will be sufficient to allow betting on all values on all pools in each selling division and to connect the Infield Indicator and 13 inside odds boards, as presently provided at Aqueduct.

Spares -

57. Spares sufficient in number in the opinion of Automatic to permit it to fulfill its obligation pursuant to the Agreement and Schedule C thereto.

Purchased Equipment

Fixed Equipment (Belmont)

58. 20 Selling Line J 11 Machine Connection Distribution Boards
59. 20 Selling Line Starter Annunciators
60. 550 Track Name and Value Slides
61. 6 Ticket Register Tray Modular Enclosures
62. 1 Central Cable Termination Board
63. 375 Sets of AC or DC Leads
64. 1 Circuit Breaker Panel
65. 10 AC Distribution Panels Without Relays
66. 14 AC Distribution Panels With Relays
67. 2 Odds Selector Relay Racks
68. 2 Results and Prices Selector Relay Racks
69. 1 Transformer
70. 442 Sets of AC and DC Leads
71. 13 AC Distribution Boards
72. 13 Powerstats
73. 2 50 volt 500 amp Rectifiers
74. 1 187.5 KVA Automatic Start Engine Generator

General (Fixed at Saratoga)

Telephone -

75. 1 30-line telephone exchange to provide communication between central and each selling division and each indicator for the use of engineers and mechanics.

Television -

76. 1 closed circuit TV system to monitor the Infield Indicator Board.

Cable -

77. Cables supplied and/or laid by Automatic will be sufficient to allow betting on all values on all pools in each selling division and to connect the Infield Indicator and 13 inside odds boards, as presently provided at Aqueduct.

Spares -

78. Spares sufficient in number in the opinion of Automatic to permit it to fulfill its obligation pursuant to the Agreement and Schedule C thereto.

Purchased Equipment

Fixed Equipment (Saratoga)

79. 12 Selling Line J 11 Machine Connection Distribution Boards
80. 12 Selling Line Starter Annunciators
81. 350 Track Name and Value Slides
82. 4 Ticket Register Tray Modular Enclosures
83. 1 Central Cable Termination Board
84. 375 Sets of AC or DC Leads
85. 1 Circuit Breaker Panel
86. 10 AC Distribution Panels Without Relays
87. 14 AC Distribution Panels With Relays
88. 2 Odds Selector Relay Racks
89. 2 Results and Prices Selector Relay Racks
90. 1 Transformer
91. 442 Sets of AC and DC Leads
92. 13 AC Distribution Boards
93. 13 Powerstats
94. 2 50 volt 500 amp Rectifiers
95. 1 187.5 KVA Automatic Start Engine Generator

EXHIBIT 2 of Schedule A
Page 1

RENTAL EQUIPMENT

Group A (Standard Pari-Mutuel, Fixed - Aqueduct)

	Units	Number	Description
96.	1	201	Central Processors (2,048 characters)
97.	1	202-1	Memory Modules (2,048 characters)
98.	5	202-2	Memory Modules (4,096 characters)
99.	1	203B-1	Tape Control Unit
100.	1	204B-1	Magnetic Tape Unit
101.	1	204B-2	Magnetic Tape Unit
102.	1	220-1	Consoles
103.	1	222-3	650 LPM Printers
104.	1	213	Memory Transfer Adapter Units
105.	1	011	Advanced Programming Instructions
106.	1	012	Program Interrupt Options
107.	1	014	Multiply-Divide Options
108.	1	015	Second Set of Eight Input-Output Trunks
109.	2	PA2A	Peripheral Adapter Units
159.	1	013	Editing Instructions

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EXHIBIT 2 of Schedule A
Page 2

RENTAL EQUIPMENT

Group B (Standard Pari-Mutuel - All Tracks)

	Units	Number	Description
110.	1	201	Central Processors (2,048 characters)
111.	1	202-1	Memory Modules (2,048 characters)
112.	5	202-2	Memory Modules (4,096 characters)
113.	1	203B-1	Tape Control Unit
114.	1	204B-1	Magnetic Tape Unit
115.	1	204B-2	Magnetic Tape Unit
116.	1	220-1	Consoles
117.	1	222-3	650 LPM Printers
118.	1	213	Memory Transfer Adapter Units
119.	1	011	Advanced Programming Instructions
120.	1	012	Program Interrupt Options
121.	1	014	Multiply-Divide Options
122.	1	015	Second Set of Eight Input-Output Trunks
123.	2	PA2A	Peripheral Adapter Units
160.	1	013	Editing Instructions

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EXHIBIT 2 of Schedule A
Page 3

RENTAL EQUIPMENT

Group C (Special Pari-Mutuel - All Tracks)

	Units	Number	Description
124.	1	201	Central Processors (2,048 characters)
125.	1	202-1	Memory Modules (2,048 characters)
126.	5	202-2	Memory Modules (4,096 characters)
127.	1	203B-1	Tape Control Unit
128.	1	204B-1	Magnetic Tape Unit
129.	2	204B-2	Magnetic Tape Units
130.	1	220-1	Consoles
131.	1	222-3	650 LPM Printers
132.	1	213	Memory Transfer Adapter Units
133.	1	011	Advanced Programming Instructions
134.	1	012	Program Interrupt Options
135.	1	014	Multiply-Divide Options
136.	1	015	Second Set of Eight Input-Output Trunks
137.	2	PA2A	Peripheral Adapter Units
138.	1	207	Card Reader Control
139.	1	208	Card Punch Control
140.	1	227	Card Reader - Card Punch
141.	1	013	Editing Instructions
142.	1	061	Hole Count Checking Option
157.	1	062	Punch Read Option
158.	1	032	Print Position Option

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EXHIBIT 2 of Schedule A
Page 4

RENTAL EQUIPMENT

Group D (Standard Pari-Mutuel - Belmont and Saratoga)

	Units	Number	Description
143.	1	201	Central Processors (2,048 characters)
144.	1	202-1	Memory Modules (2,048 characters)
145.	5	202-2	Memory Modules (4,096 characters)
146.	1	203B-1	Tape Control Unit
147.	1	204B-1	Magnetic Tape Unit
148.	1	204B-2	Magnetic Tape Unit
149.	1	220-1	Consoles
150.	1	222-3	650 LPM Printers
151.	1	213	Memory Transfer Adapter Units
152.	1	011	Advanced Programming Instructions
153.	1	012	Program Interrupt Options
154.	1	014	Multiply-Divide Options
155.	1	015	Second Set of Eight Input-Output Trunks
156.	2	PA2A	Peripheral Adapter Units
161.	1	013	Editing Instructions

SCHEDULE B

Equipment Deliveries Prior to August 31, 1965 - System #1

To be Delivered February 1 to Data Trends, Inc., Parsippany, New Jersey

Units	Model Number	Description	Basic Monthly Rental Charge	Total Basic Monthly Rental Charge	Unit Hourly Rental Charge for Use Over 200 Hours	Unit Purchase Price	Purchase Option Credit (Percent)	Monthly Maintenance Charges Based on Age of Machines in Months 0-36	37-72	73-108
1	201	Central Processors (2,048 Characters)	$950.	$ 950.	$ 2.16	$42,750	70	$ 76.00	$ 63.00	$ 54.00
1	202-1	Memory Modules (2,048 Characters)	125.	125.	.28	5,625	70	6.25	5.00	4..
1	202-2	Memory Modules (4,096 Characters)	250.	250.	.57	11,250	70	12.50	10.50	9.00
1	203-B-1	Tape Control Unit	425.	425.	.97	19,125	70	34.00	28.00	24.00
1	204-B-1	Magnetic Tape Unit	350.	350.	.80	15,750	50	59.50	49.50	42.50
1	220-1	Console	200.	200.	.45	9,000	70	16.00	13.50	11.50
1	011	Advanced Programming Instructions	100.	100.	.23	4,500	70	8.00	7.20	6.80
1	012	Program Interrupt Options	50.	50.	.11	2,250	70	4.00	3.40	2.85
2	PA2A	Peripheral Adapter Units	110.	220.	.25	4,950	70	8.80	7.30	6.25

To be Delivered April 1, 1965

1	015	Second Set of Eight I/O Trunks	150.	150.	.34	6,750	70	12.00	10.00	8.50
1	222-3	650 LPM Printer	900.	900.	2.05	40,500	50	180.00	150.00	128.
1	207	Card Reader Control	240.	240.	.55	10,800	70	19.00	16.00	13.50
1	208	Card Punch Control	210.	210.	.48	9,450	70	17.00	14.00	12.00
1	227	Card Reader - Card Punch	560.	560.	1.27	30,215	60	45.00	61.25	[illegible].75
1	013	Editing Instructions	90.	90.	.20	4,050	70	7.00	6.00	5.00
1	061	Hole Count Checking Option	100.	100.	.23	4,500	70	8.00	7.20	6.80
4	202-2	Memory Modules	250.	1,000.	.57	11,250	70	12.50	10.50	9.00

(The above equipment is to be delivered initially to Data Trends, Inc., Parsippany, N. J. and moved to Saratoga Club House, Saratoga Springs, N. Y. by July 1, 1965.)

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SCHEDULE B

Equipment Deliveries Prior to August 31, 1965 - System #2

To be Delivered June 1, 1965

Units	Model Number	Description	Basic Monthly Rental Charge	Total Basic Monthly Rental Charge	Unit Hourly Rental Charge for Use Over 200 Hours	Unit Purchase Price	Purchase Option Credit (Percent)	Monthly Maintenance Chgs Based on Age of Machine in Months 0-36	37-72	73-108
1	201	Central Processors	$950.	$ 950.	$ 2.16	$42,750	70	$ 76.00	$ 63.00	$ 54.00
1	202-1	Memory Modules	125.	125.	.28	5,625	70	6.25	5.00	4.50
5	202-2	Memory Modules	250.	1,250.	.57	11,250	70	12.50	10.50	9.00
1	203-B-1	Tape Control Unit	425.	425.	.97	19,125	70	34.00	28.00	24.00
1	204-B-1	Magnetic Tape Units	350.	350.	.80	15,750	50	59.50	49.50	42.50
2	204-B-2	Magnetic Tape Units	300.	600.	.68	13,500	50	51.00	42.50	36.50
1	220-1	Console	200.	200.	.45	9,000	70	16.00	13.50	11.50
1	222-3	Printer	900.	900.	2.05	40,500	50	180.00	150.00	128.00
2	213	Memory Transfer Units	400.	800.	.91	18,000	70	32.00	26.50	23.00
1	011	Advanced Programming Instructions	100.	100.	.23	4,500	70	8.00	7.20	6.80
1	012	Program Interrupt Option	50.	50.	.11	2,250	70	4.00	3.40	2.85
2	014	Multiply-Divide Options	250.	500.	.57	11,250	70	20.00	16.50	14.50
1	013	Editing Instructions	90.	90.	.20	4,050	70	7.00	6.00	5.00
1	015	Second Set of Four I/O Trunks	150.	150.	.34	6,750	70	12.00	10.00	8.50
2	PA2A	Peripheral Adapter Units	110.	220.	.25	4,950	70	8.80	7.30	6.25
1	062	Punch-Read Feed Option	105.	105.	.24	4,535	50	10.50	9.00	8.00
1	032	Print Position Option	65.	65.	.15	2,925	50	13.00	11.00	9.00

(The above equipment is to be delivered initially to Data Trends, Inc., Parsippany, N. J. and moved to Saratoga Club House, Saratoga Springs, N. Y. by July 1, 1965.)

January 1, 1966 to Aqueduct

Units	Model Number	Description	Basic Monthly Rental Charge	Total Basic Monthly Rental Charge	Unit Hourly Rental Charge For Use Over 200 Hours	Unit Purchase Price	Purchase Option Credit (Percent)	Monthly Maintenance Charges Based on Age of Machines in Months 0-36	37-72	73-108
1	201	Central Processors (2,048 characters)	$ 950.	$ 950.	$ 2.16	$ 42,750.	70	$ 76.00	$ 63.00	$ 54.00
1	202-1	Memory Modules (2,048 Characters)	125.	125.	.28	5,625.	70	6.25	5.00	4.50
5	202-2	Memory Modules (4,096 Characters)	250.	1,250.	.57	11,250.	70	12.50	10.50	9.00
1	203B-1	Tape Control Units	425.	425.	.97	19,125.	70	34.00	28.00	24.00
1	204B-1	Magnetic Tape Units	350.	350.	.80	15,750.	50	59.50	49.50	42.50
1	204B-2	Magnetic Tape Units	300.	300.	.68	13,500.	50	51.00	42.50	36.50
1	220-1	Consoles	200.	200.	.45	9,000.	70	16.00	13.50	11.50
1	222-3	650 Lpm Printers	900.	900.	2.05	40,500.	50	180.00	150.00	128.00
1	213	Memory Transfer Adapter Units	400.	400.	.91	18,000.	70	32.00	26.50	23.00
1	011	Advanced Programming Instructions	100.	100.	.23	4,500.	70	8.00	7.20	6.80
1	012	Program Interrupt Options	50.	50.	.11	2,250.	70	4.00	3.40	2.85
1	014	Multiply-Divide Options	250.	250.	.57	11,250.	70	20.00	16.50	14.50
1	015	Second Set of Eight Input-Output Trunks	150.	150.	.34	6,750.	70	12.00	10.00	8.50
2	PA2A	Peripheral Adapter Units	110.	220.	.25	4,950.	70	8.80	7.30	6.25
1	013	Editing Instructions	90.	90.	.20	4,050.	70	7.00	6.00	5.00

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SYSTEM #4 - to be delivered on or before March 1, 1966 to Belmont or Saratoga, as Automatic may direct

Units	Model Number	Description	Basic Monthly Rental Charge	Total Basic Monthly Rental Charge	Unit Hourly Rental Charge For Use Over 200 Hours	Unit Purchase Price	Purchase Option Credit (Percent)	Monthly Maintenance Charges Based on Age of Machines in Months 0-36	37-72	73-108
1	201	Central Processors (2,048 Characters)	$ 950.	$ 950.	$ 2.16	$ 42,750.	70	$ 76.00	$ 63.00	$ 54.00
1	202-1	Memory Modules (2,048 Characters)	125.	125.	.28	5,625.	70	6.25	5.00	4.50
5	202-2	Memory Modules (4,096 Characters)	250.	1,250.	.57	11,250.	70	12.50	10.50	9.00
1	203B-1	Tape Control Units	425.	425.	.97	19,125.	70	34.00	28.00	24.00
1	204B-1	Magnetic Tape Units	350.	350.	.80	15,750.	50	59.50	49.50	42.50
1	204B-2	Magnetic Tape Units	300.	300.	.68	13,500.	50	51.00	42.50	36.50
1	220-1	Consoles	200.	200.	.45	9,000.	70	16.00	13.50	11.50
1	~~222-3~~ 646	650 Lpm Printers	900.	900.	2.05	40,500.	50	180.00	150.00	128.00
1	213	Memory Transfer Adapter Units	400.	400.	.91	18,000.	70	32.00	26.50	23.00
1	011	Advanced Programming Instructions	100.	100.	.23	4,500.	70	8.00	7.20	6.80
1	012	Program Interrupt Options	50.	50.	.11	2,250.	70	4.00	3.40	2.85
1	014	Multiply-Divide Options	250.	250.	.57	11,250.	70	20.00	16.50	14.50
1	015	Second Set of Eight Input-Output Trunks	150.	150.	.34	6,750.	70	12.00	10.00	8.50
2	PA2A	Peripheral Adapter Units	110.	220.	.25	4,950.	70	8.80	7.30	6.25
1	013	Editing Instructions	90.	90.	.20	4,050.	70	7.00	6.00	5.00

In addition to the foregoing items of equipment, Honeywell will deliver to Automatic, by way of its subcontractor Data Trends, Inc., the following:

1. Honeywell Standard Specifications for all items of equipment furnished by it shall be delivered by September 1, 1964 except that with respect to the Model 213 Memory Transfer Adapter Unit, the Specifications shall be delivered by November 1, 1964.

2. Five (5) programming Manuals for the H-200 shall be delivered by September 1, 1964.

3. H-200 Utility Program packages which include the programs or routines identified as Loader and Monitor, THOR, SCOPE, Update and Select, TIP-TOP, Sorts, EASYCODER, EASYTRAN, BRIDGE and TABSM, complete with card decks, listings and documentation shall be delivered by January 1, 1965.

4. Honeywell 200 programming course for five (5) programmers shall be started, no later than October 1, 1964.

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SCHEDULE B

To Agreement dated July 30, 1964, between
The New York Racing Association Inc. (NYRA)
and Automatic Totalisators Limited (Automatic)

W I T N E S S E T H:

WHEREAS, Automatic has entered into a Lease Agreement (hereinafter referred to as "Lease Agreement"), dated July 30, 1964, with Honeywell Inc., a Delaware corporation, for the lease of certain computers and related equipment for installation as part of a totalisator system at Aqueduct, Belmont and Saratoga Race Tracks in New York State (which equipment is more fully described in Exhibit A hereto and is hereinafter referred to as "Leased Equipment"); and

WHEREAS, NYRA is desirous of subleasing from Automatic said Leased Equipment more fully described hereafter upon the terms and conditions hereinafter set forth;

NOW, THEREFORE, in consideration of the mutual covenants herein contained,

IT IS AGREED AS FOLLOWS:

Equipment Leased

1. Automatic shall lease to NYRA for the term

hereof the Leased Equipment at the monthly rental charges stated in Exhibit A annexed hereto.

(a) The charges listed for the Leased Equipment are those in effect on the date of the Basic Agreement. These charges are subject to change after January 31, 1974, upon three (3) months' prior written notice and as provided in Section 11 of the Lease Agreement after December 31, 1970.

(b) The basic monthly rental charge shall entitle NYRA to a maximum of 200 hours of operational use time for each item of Leased Equipment during each full calendar month and, for less than a full calendar month, one-thirtieth (1/30th) of 200 hours for each day the item of Leased Equipment was installed and ready for use after the delivery date hereinafter provided.

The basic monthly rental charge for fractions of a calendar month shall be computed at the rate of one-thirtieth (1/30th) of the basic monthly rental charge for each day the Leased Equipment was installed and ready for use after the delivery date hereinafter provided.

Any unused portion of the maximum operational

use time shall not be carried over into subsequent months.

Where there is more than one item of Leased Equipment of the same type in an installation, the maximum operational use time shall be the product of 200 hours multiplied by the number of like items of Leased Equipment. In such a case, even though an individual item of Leased Equipment is used more than 200 hours, no extra-use charge shall be payable unless the total use of all such items of Leased Equipment exceeds the product of 200 hours multiplied by the number of like items of Leased Equipment installed for the entire month.

(c) If in any calendar month, any item of Leased Equipment, except as provided in subparagraph (b) above, is used in excess of the maximum 200-hour operational use time, the charges for such extra use shall be computed at the hourly rates listed in Exhibit A for extra use prorated for the actual time used.

(d) Under subparagraphs (b) and (c), any item of Leased Equipment employed during a given program run shall be considered to have been in use

for the full time of the program.

(e) Charges are due and payable monthly, five (5) days net from date of invoice, provided, however, that for the period ending January 31, 1966, the monthly payment shall be 90% of the invoiced amount. The remaining 10% shall be paid no later than February 15, 1966, provided the Basic Agreement between the parties be not terminated in accordance with its terms prior thereto.

(f) Any taxes, however designated, arising from or based upon the charges payable hereunder by NYRA or upon this Lease or upon the Leased Equipment or its use shall be paid by NYRA in addition to such charges, exclusive, however, of personal property taxes and income taxes and corporate excise taxes assessed against Automatic or the owner of the Leased Equipment.

(g) Upon Automatic receiving the one month's basic rental credit provided for in Section (2(h)) of its Lease Agreement with Honeywell, a copy of which has been furnished to NYRA, it shall credit same to NYRA.

(h) It is understood that rental charges

shall commence on each item of Leased Equipment as it is installed and made ready for use in accordance with the delivery schedule set forth in Section 2 hereof.

Delivery Schedule

2. The items of Leased Equipment listed in Exhibit A as are planned for use in the testing, checkout and operation of the system for NYRA shall be delivered in accordance with the delivery schedule included in Exhibit A.

Installation

3. Space for the Leased Equipment shall be provided by NYRA at its expense and the Leased Equipment shall not be moved by NYRA except under Automatic's supervision or with Automatic's prior written consent.

Insurance

4. NYRA shall be relieved from all risks of physical loss or damage to the Leased Equipment during periods of transportation, installation and during the entire time such Leased Equipment is in the possession of NYRA, except when such loss or damage is due to the fault or failure of performance by NYRA.

5. NYRA shall indemnify and hold Automatic harm-

less from any loss or damage to persons or property arising out of NYRA's use or possession of the Leased Equipment, which indemnity shall survive the termination of this Lease, provided that such loss, claim or damage was not caused by a breach of warranty by Automatic under the Basic Agreement, failure of performance on the part of Automatic pursuant to Schedule C of the Basic Agreement, or by the fault or negligence of Automatic or Honeywell or the fault or negligence of their employees or representatives.

Option to Purchase

6. Pursuant to the Lease Agreement between Automatic and Honeywell, Automatic has an option to purchase the Leased Equipment under certain terms and conditions. NYRA is hereby granted an option to purchase from Automatic any item of Leased Equipment which Automatic purchases from Honeywell on exercise of its option. In addition, Automatic agrees that it shall exercise the option granted to it by Honeywell as to any item of Leased Equipment promptly upon its receiving written notice from NYRA that it elects to exercise its option to purchase said item of Leased Equipment from Automatic. The terms under which NYRA may exercise said option shall be in all

instances identical to the terms set forth in the Lease Agreement between Automatic and Honeywell except that the purchase payments, in view of the risks being taken by Automatic as prime contractor, shall be in each instance 10% higher than those paid or payable by Automatic to Honeywell.

7. In the event that NYRA exercises the aforesaid option, NYRA will assume the obligations of Automatic under the maintenance agreement entered into between Automatic and Honeywell as required by the Lease Agreement upon exercise of the option contained therein. All warranties made by Automatic as to the Leased Equipment so purchased shall cease and terminate upon NYRA's exercise of the aforesaid option, and Automatic shall be released from all liability and responsibility for the performance, operation and maintenance of said Leased Equipment. Upon such exercise, the maintenance charges pursuant to Schedule C to the Basic Agreement shall be decreased by the amount set forth as maintenance charges on Schedule B to the Lease Agreement between Honeywell and Automatic.

Agreement Term

8. (a) This Lease shall continue until January 31, 1974, and shall remain in force thereafter until ter-

minated by either party on three (3) months' prior written notice, provided, however, that NYRA shall have the right to terminate this Lease forthwith if either

1. The New York State Racing Commission or the New York State Tax Commission fails to approve the system by the date specified in the Basic Agreement or revokes its approval of the system; or

2. The tests provided for in the Basic Agreement between Automatic and NYRA are not successful; or

3. Pari-mutuel betting or racing at any of the NYRA tracks shall be prohibited or made illegal; or

4. Automatic shall default in the performance of any provision hereof and such default shall continue for ten (10) days after written notice thereof has been sent to Automatic.

(b) Automatic, with NYRA's prior written consent, may substitute other equipment of Honeywell or others for that ordered hereunder, subject to the standard prices charged therefor, delivery schedules and other terms and conditions as may be applicable thereto.

(c) Upon default of NYRA, and such default continuing for ten (10) days after written notice thereof Automatic shall have the right to terminate this Lease.

Assignment of Agreement

9. NYRA shall not have the right to assign this Lease or sublease the Leased Equipment leased hereunder to any other person, firm or corporation without the written consent of Automatic.

Improvements

10. During the terms of this Lease, Automatic shall notify NYRA promptly in writing, from time to time, of all improvements in the Leased Equipment of which it has received notice from Honeywell, and at the request of NYRA, will, from time to time, cause modifications and changes to be made in the equipment to reflect such improvements. The charges to be paid by NYRA for such improvements, or new items of Leased Equipment and the installation thereof, shall be Honeywell's published prices therefor and if not published then at such prices as may be agreed upon by the parties from time to time.

General

11. Automatic shall hold NYRA harmless against any loss, damage or liability resulting from acts of persons employed or retained by it to perform any installation or other service herein.

12. Automatic, to the extent permitted by law, shall pass hereby to NYRA the applicable investment tax credits available on the Leased Equipment, to the extent Automatic is entitled to the same pursuant to the Lease Agreement, during the initial term of this Lease.

13. Any names and terms defined in the Basic Agreement between the parties to which this Schedule is attached and as used herein, shall have the same meaning as are given to them in said Basic Agreement.

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EXHIBIT A TO SCHEDULE B

(Page 1)

Equipment Deliveries Prior to August 31, 1965 - System #1

To be Delivered February 1 to Data Trends, Inc. Parsippany, New Jersey

Units	Model Number	Description	Basic Monthly Rental Charge	Total Basic Monthly Rental Charge	Unit Hourly Rental Charge For Use Over 200 Hours
1	201	Central Processors (2,048 Characters)	$950.	$ 950.	$ 2.16
1	202-1	Memory Modules (2,048 Characters)	125.	125.	.28
1	202-2	Memory Modules (4,096 Characters)	250.	250.	.57
1	203-B-1	Tape Control Unit	425.	425.	.97
1	204-B-1	Magnetic Tape Unit	350.	350.	.80
1	220-1	Console	200.	200.	.45
1	011	Advanced Programming Instructions	100.	100.	.23
1	012	Program Interrupt Options	50.	50.	.11
2	PA2A	Peripheral Adapter Units	110.	220.	.25

To be Delivered April 1, 1965

1	015	Second Set of Eight I/O Trunks	150.	150.	.34
1	222-3	650 LPM Printers	900.	900.	2.05
1	207	Card Reader Control	240.	240.	.55
1	208	Card Punch Control	210.	210.	.48
1	227	Card Reader - Card Punch	560.	560.	1.27
1	013	Editing Instructions	90.	90.	.20
1	061	Hole Count Checking Option	100.	100.	.23
4	202-2	Memory Modules	250.	1,000.	.57

(The above equipment is to be delivered initially to Data Trends, Inc., Parsippany, N.J. and moved to Saratoga Club House, Saratoga Springs, N.Y. by July 1, 1965.)

EXHIBIT A TO SCHEDULE B

(Page 2)

Equipment Deliveries Prior to August 31, 1965 - System #2

To be Delivered June 1, 1965

Units	Model Number	Description	Basic Monthly Rental Charge	Total Basic Monthly Rental Charge	Unit Hourly Rental Charge For Use Over 200 Hours
1	201	Central Processors	$950.	$ 950.	$ 2.16
1	202-1	Memory Modules	125.	125.	.28
5	202-2	Memory Modules	250.	1,250.	.57
1	203-B-1	Tape Control Unit	425.	425.	.97
1	204-B-1	Magnetic Tape Units	350.	350.	.80
2	204-B-2	Magnetic Tape Units	300.	600.	.68
1	220-1	Console	200.	200.	.45
1	222-3	Printer	900.	900.	2.05
2	213	Memory Transfer Units	400.	800.	.91
1	011	Advanced Programming Instructions	100.	100.	.23
1	012	Program Interrupt C[illegible]	50.	50.	.11
2	014	Multiply-Divide [illegible]	250.	500.	.57
1	013	Editing Instr[illegible]	90.	90.	.20
1	015	Second Set of [illegible]	150.	150.	.34
2	PA2A	Peripheral [illegible]	110.	220.	.25
1	062	Punch Reec[illegible]	[illegible]	[illegible]	.24
1	032	Print Po[illegible]	[illegible]	[illegible]	.15

(The above equipment [illegible] Inc., Parsippany, N.J. and moved to Saratoga Club House, [illegible]ga Springs, N.Y. [illegible] 1965.)

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EXHIBIT A TO SCHEDULE B

(Page 3)

SYSTEM #3 - to be delivered on or before
January 1, 1966 to Aqueduct

Units	Model Number	Description	Basic Monthly Rental Charge	Total Basic Monthly Rental Charge	Unit Hourly Rental Charge For Use Over 200 Hours
1	201	Central Processors (2,048 Characters)	$950.	$ 950.	$ 2.16
1	202-1	Memory Modules (2,048 Characters)	125.	125.	.28
5	202-2	Memory Modules (4,096 Characters)	250.	1,250.	.57
1	203-B-1	Tape Control Units	425.	425.	.97
1	204-B-1	Magnetic Tape Units	350.	350.	.80
1	204-B-2	Magnetic Tape Units	300.	300.	.68
1	220-1	Consoles	200.	200.	.45
1	222-3	650 Lpm Printers	900.	900.	2.05
1	213	Memory Transfer Adapter Units	400.	400.	.91
1	011	Advanced Programming Instructions	100.	100.	.23
1	012	Program Interrupt Options	50.	50.	.11
1	014	Multiply-Divide Options	250.	250.	.57
1	015	Second Set of Eight Input-Output Trunks	150.	150.	.34
2	PA2A	Peripheral Adapter Units	110.	220.	.25
1	013	Editing Instructions	90.	90.	.20

EXHIBIT A TO SCHEDULE B

(Page 4)

SYSTEM #4 - to be delivered on or before March 1, 1966 to Belmont or Saratoga (as NYRA may direct

Units	Model Number	Description	Basic Monthly Rental Charge	Total Basic Monthly Rental Charge	Unit Hourly Rental Charge For Use Over 200 Hours
1	201	Central Processors (2,048 Characters)	$950.	$ 950.	$ 2.16
1	202-1	Memory Modules (2,048 Characters)	125.	125.	.28
5	202-2	Memory Modules (4,096 Characters)	250.	1,250.	.57
1	203-B-1	Tape Control Units	425.	425.	.97
1	204-B-1	Magnetic Tape Units	350.	350.	.80
1	204-B-2	Magnetic Tape Units	300.	300.	.68
1	220-1	Consoles	200.	200.	.45
1	222-3	650 Lpm Printers	900.	900.	2.05
1	213	Memory Transfer Adapter Units	400.	400.	.91
1	011	Advanced Programming Instructions	100.	100.	.23
1	012	Program Interrupt Options	50.	50.	.11
1	014	Multiply-Divide Options	250.	250.	.57
1	015	Second Set of Eight Input-Output Trunks	150.	150.	.34
2	PA2A	Peripheral Adapter Units	110.	220.	.25
1	013	Editing Instructions	90.	90.	.20

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SCHEDULE C

To Agreement dated July 30, 1964 between The New York Racing Association Inc. (NYRA) and Automatic Totalisators Limited (Automatic)

Terms of Arrangment for Servicing of Equipment

1. Any names and terms defined in the Agreement referred to above (the "Agreement") to which this schedule is attached and as used herein, shall have the same meanings as are given to them in the Agreement.

2. For a period extending to January 31, 1974, unless terminated at an earlier date pursuant to paragraph 9 hereof, Automatic will maintain and service the Equipment, which term as used in this schedule shall include any ancillary equipment and any replacement parts and improvements furnished from time to time pursuant to the Agreement or to this schedule, and Automatic shall furnish any necessary labor and materials needed for such purpose. To this end, Automatic will, at its own expense, service all of the Equipment and maintain it in efficient operating condition during each race betting interval on all racing days at any of the NYRA tracks and on such days will supply a staff of at least twenty-six engineers and technicians sufficient to handle the operation of the Equipment, the servicing of the ticket issuing machines

throughout such days with ticket paper, the maintenance of the Equipment and keeping it in efficient operating condition. Automatic also undertakes to perform during the period hereof such replacement and other services as are provided for in paragraph 7 of the Agreement.

3. Certain of the Equipment is portable and is designed to be transported and used at each of the three NYRA tracks. On the basis of operations in 1963 (assuming Belmont completed), six moves per annum will be involved. Automatic will provide all personnel necessary and will undertake to disconnect, transport and reconnect all the Equipment involved in such moves. In the event that, following the initial installation of all the Equipment under the Agreement, it should be necessary during the period hereof to effect additional moves of any or all of the Equipment, Automatic will also undertake at the request of NYRA to accomplish such moves provided that it is reimbursed for the additional expenses involved.

4. Automatic will carry workmen's compensation insurance on employees provided pursuant hereto and will pay all premiums in connection therewith and also will indemnify NYRA against any loss or damage or liability resulting from the acts of the persons employed or retained by Automatic to perform any services hereunder.

5. Automatic will provide all ribbons, ribbon ink, and codes required for the operation of the Equipment, storage for reasonable quantities of such items to be provided by NYRA at the tracks where the same will be used. NYRA shall provide the ticket paper rolls required at the operation, which rolls will, however, be sold by Automatic to NYRA if the latter should so request. The additional charge payable by NYRA in the latter event shall be at the rate of $200,000 per annum for 26,500 rolls of 6,000 tickets each, the charge to be billed to NYRA monthly based upon the ticket paper furnished during the preceding month.

6. Without in any way limiting the representations and warranties of Automatic in paragraph 1 of the Agreement or the rights of NYRA for a breach of any thereof, Automatic will reimburse NYRA upon demand for all amounts which it shall be required to dispense by reason of machine errors of the Equipment and payments on counterfeit tickets, provided, however, that Automatic shall receive credit for all like overages to the extent that NYRA is otherwise entitled to retain the same, provided further that Automatic shall not be required to make reimbursement hereunder if the error is due to the negligence or willful misconduct of NYRA or any of its employees or of third parties (except in the case of counterfeit tickets) other than subcontractors or assignees of Automatic

or their employees or representatives.

7. In return for all of the services and materials agreed to be supplied by Automatic hereunder, NYRA shall pay to Automatic a service charge of $425,000 per annum, payable in equal monthly payments on the first day of each month, the first such payment to be due on March 1, 1966 for the month of February, 1966.

8. If the index of Average Hourly Wages of Production Workers in Manufacturing Industries for August of any year commencing after December 31, 1970 during the term or any extended term hereof, as computed and published by the United States Bureau of Labor Statistics, shows an increase of 15% or more above such index for August, 1964 (or August of the year preceding the last year in which an adjustment was made under this paragraph, if there has been any such adjustment), Automatic shall have the option to require that the service charges be renegotiated by NYRA by giving written notice to NYRA on or before December 1 of such calendar year.

9. This arrangement shall terminate and be void and of no further effect in the event that pari-mutuel betting on racing at any of the NYRA tracks shall be prohibited or made illegal or upon termination of the Agreement. This

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arrangement may be terminated forthwith by NYRA in the event of a default by Automatic in the performance of any provision hereof on its part to be performed or to be performed by it or any subcontractor or assignee under the provision of the Agreement or any other schedule thereto, which default shall not be cured within a period of ten days after written notice thereof shall have been given by NYRA. Termination shall not affect the continuing obligation of Automatic to indemnify and hold NYRA harmless as specifically provided herein. The above rights of termination shall be in addition to such other rights and remedies as NYRA shall or may have hereunder or by statutes or common law.

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10. NYRA shall have the right exercisable by written notice to Automatic not less than 60 days prior to the expiration of the period provided for in paragraph 2 hereof to extend this arrangement for an additional two year period.

TOTALISATOR SYSTEM PATENTS - AMERICAN TOTALISATOR COMPANY, INC.

Patent Number	Filing Date	Issue Date	Inventor	Patent Title	Classification	Brief Abstract
2 182 875	Sept. 12, 1936	Dec. 12, 1939	O. C. Levy	Totalizing System	235-92	Features a stepping switch collector which remains at rest except when a TIM needs service. If several TIMs bid simultaneously, they are served in a prescribed order.
2 179 698	Feb. 15, 1937	Nov. 14, 1939	O. C. Levy	Totalizing System	235-92	Features the "direct-acting (no search), all-relay collector" cited in Lange '384 and elsewhere. Also services simultaneously bidding TIMs in defined sequential order.
2 332 756	Sept. 5, 1939	Oct. 26, 1943	H. C. Robinson	Totalizer System	235-92	A simpler, cheaper tote for very small tracks where normal tote costs are prohibitive : • No display boards (register indicators only) • Veeder-Root counter adding machines (pulsed as often as required for each denomination)

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PX	Patent Number	Filing Date	Issue Date	Inventor	Patent Title	Classification	Brief Abstract
148G	2 557 384	Dec. 10, 1945	June 19, 1951	M. R. Klein	Totalizator	235-92	Uses vacuum tube decade counters and electro-mechanical "pulse commutators" to overcome the speed limitations of all-electromechanical totalizators.
148H	2 563 041	Mar. 22, 1948	Aug. 7, 1951	A. J. Johnston	Totalizator System	235-92	Features multi-channel (7) adding machines which can simultaneously accept a number of bits of differing denomination.
148I	2 652 977	Dec. 21, 1949	Sept. 22, 1953	O. C. Levy	Computer	235-61	Analog odds computer sub-system using relays and tubes and including provision for scratch or refund, morning line set-up, display indicator output, and electro-mechanical totalizator input.
3D	3 051 384	Oct. 9, 1959	Aug. 28, 1962	L. J. Lange	Totalisator System	235-92	Tote for a small track, featuring only two channels per pool (one channel for $2 and one channel for all other denominations). Also minimizes control components in each RAM by putting as much as possible in the TAM.

PX	Patent Number	Filing Date	Issue Date	Inventor	Patent Title	Classification	Brief Abstract
148L	3 080 114	July 8, 1960	Mar. 5, 1963	L.J. Lange	Totalisator System	235-92	Tote intended to provide cost and speed advantages through several features. • A single multi-digit electromechanical counter for all but the least significant adding machine digits. • Two channel tote (one channel for WIN and COMBINE, the other for PLACE and SHOW) • Multi channel adding machines such that (except for $50) only a single pulse is needed to aggregate any bet of a lesser denominations.

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U. S. DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE

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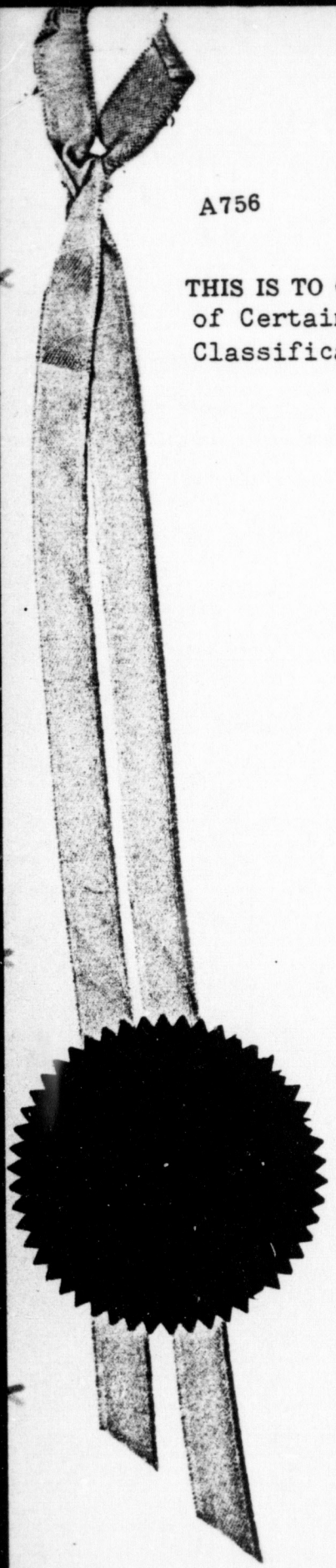
January 17, 1975
(Date)

THIS IS TO CERTIFY that the annexed is a true copy from the records of this office of Certain Requested Documents, in a Publication entitled:- Classification Definitions, identified therein.



By authority of the
COMMISSIONER OF PATENTS

W B. Walton

Certifying Officer.

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UNITED STATES PATENT OFFICE

CLASSIFICATION DEFINITIONS

CLASS 235, REGISTERS

Revision 1

REVISED BY THE OFFICE OF PATENT CLASSIFICATION
JANUARY 1967

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This publication is available from the Patent Office, U.S. Department of Commerce, Washington, D.C., 20231, price 25 cents. Check or money order should be made payable to the Commissioner of Patents.

Class 235, REGISTERS

CLASS DEFINITIONS

This class includes machines employed for ascertaining the number of movements of various devices or machines; also, indicating devices where the purpose is to disclose the numerical extent or quantity of movement of a machine and where the device is separate and independent of the machine whose movements are to be noted; also organized machines, such as, cash-registers, fare-registers, voting machines and calculators having registering or counting devices as essential or important elements and having in addition certain other features necessary to make up the complete machines for the purposes desired. In this class are also recording calculating machines, as--recording cash-registers, and recording voting-machines, which are classified herein instead of in classes providing for the particular recording means, by reason of the analogy of the machines as entireties to other machines (cash-registers, etc.), in this class. These recording devices usually, but not invariably, comprise attachments for printing numbers.

Registers per se include attachments to machines where the purpose is to ascertain or count the number of movements thereof, such as engine-counters, counters for printing-presses, etc. They also include devices comprising indicating hands or pointers (or equivalents thereof), whether moved regularly or irregularly, forward or backward, in cooperation with a scale or index to disclose the numerical extent of movement.

In addition to registers per se, the class is subdivided into various groups according to the functions of the machines classified therein.

The registering mechanisms employed in cash-registers (except those in subclass 13) and calculators are capable of being operated to different extents--that is, if they comprise drums having numerals from "0" to "9" on their peripheries they may be operated one step or more up to the limit at one operation, dependent upon the key or equivalent actuated. Moreover, any drum or drums (or equivalent) in the set representing different orders, as units, tens, etc., or dollars and cents, may be operated either singly or together. In these respects the registers are different in their operation from those in the other groups, where the actuator is in operative relation only with the wheel or other device of lowest order and moves the same one step at a time, the tens being "carried" as this or any other wheel completes its rotation.

Cash-registers, classified in this class, are classified machines employed in mercantile establishments for the purpose of keeping a check upon the financial transactions. These machines usually comprise keys or equivalents, registering devices, indicating-tablets, or drums to disclose to the purchaser the amount of the sale, a cash-drawer, a bell or other alarm, and various subordinate devices mainly for the purpose of compelling the clerk or cashier to completely and correctly operate the machine. It also includes machines where an autographic record of the transaction is made upon a movable strip of paper, together with means for moving the paper, a cash-drawer, and other subsidiary devices.

SEARCH CLASS-

15, Brushing, Scrubbing and General Cleaning, subclass 250+, for attachments for cleaning windows of registers, where only the features of the register casing and window are claimed that provide for attachment and operation of the cleaning element. When other register features are claimed, for example, an operating connection with the register mechanism, classification is in class 235.

73, Measuring and Testing, for all registering measuring instruments wherein the register is claimed broadly or specifically in combination with significant measuring structure of the type provided for in said class. Class 235 includes only registering mechanism per se for measuring instruments. However, since it is usually necessary to include with the register some conventional measuring element to define a locus or setting for the register, the mere naming in a claim or claims of such conventional measuring element or its description in general terms will not exclude such claims from class 235.

137, Fluid Handling, subclass 551+ for fluid handling apparatus including a register in combination.

166, Wells, subclasses 4 and 64 for well processes and apparatus involving registers or counting means.

221, Article Dispensing, particularly subclass 7 for article dispensing devices, not otherwise provided for, combined with dispenser operated registers.

222, Dispensing, particularly subclasses 24-38 for registers combined with significant dispensing features.

234, Selective Cutting (e.g., Punching), subclass 4+ for a selective punching device having means to totalize incremental values assigned to the different punches (for justification control); subclass 21, for a selective punching device having means to register the number of its operations (for control purposes).

Subclasses

1. Subject matter under the class definition not elsewhere classifiable.

2. Cash-registers under the class definition embodying both a register and a recording attachment or an attachment for printing the amount of the sale registered.

SEARCH THIS CLASS, SUBCLASS-
58+, for calculators having recording mechanism.

3. Cash-registers under subclass 2 having in addition an attachment for feeding, printing, and delivering from the machine a check showing the amount of the sale, together with additional data, if desired, such as the date of the transaction, etc.

4. Machines under the class definition constructed like cash-registers, but having the register replaced by a recording device for preserving a record of the sales.

5. Cash-recorders under subclass 4 containing a movable strip of paper on which a memorandum of the transaction is manually made, together with devices ordinarily found in cash-registers for moving the paper and also, if desired, other features characteristic of cash-recorders.

SEARCH CLASS-
242, Winding and Reeling, subclass 55+, for machines in which an autographic record of the transaction is made upon movable strips of paper, either singly or in duplicate, one or more of the strips being rolled up in the machine, and comprising nothing more than the strips of paper, together with the means for moving the same and rolling them within the machine.

6. Cash-registers under subclass 7 including two or more separate and distinct attachments for registering the sales of different clerks or departments, a single set of cash-keys, and separate keys or other devices whereby the cash-keys may be placed in operative connection with any desired registering attachments.

SEARCH THIS CLASS, SUBCLASS-
29, for multiple fare registers.

7. Subject matter under the class definition comprising cash-registers.

8. Cash-registers under subclass 7 where the keys are employed merely for setting certain parts into operative position, which parts by a subsequent movement of another part of the machine are so actuated as to cause the operation of the machine.

9. Cash-registers under subclass 8 operated by the rotation of a crank or the movement of a lever.

SEARCH THIS CLASS, SUBCLASS-
21, for lever operated, dial cash-registers

10. Cash-registers under subclass 8 operated by the movement of the drawer.

SEARCH THIS CLASS, SUBCLASS-
22, for drawer operating mechanism per se.

11. Cash-registers under subclass 8 wherein the movement of the key releases a spring or other motor which actuates the machine.

SEARCH THIS CLASS, SUBCLASS-
62, for motor operated calculators.

12. Cash-registers under subclass 7 in which the pressing of the key causes the operation of the various parts of the cash-register, as the indicators, registers, drawer-opening devices, etc.

13. Cash-registers under subclass 12 wherein a separate and independent register is connected to each key.

14. Cash-registers under subclass 12 wherein several keys act upon the same set of register wheels, the wheels being actuated a different distance according to the value of the key operated.

15. Cash-registers under subclass 14 having differential mechanism where a key-lever when actuated is connected with a coupling or "universal" bar, so that when several keys are thus coupled further pressure upon any one of such keys will cause the operation of the machine.

16. Cash-registers under subclass 14 having differential mechanism wherein the key-levers move a certain distance, depending upon the value of the key, before causing any movement of the parts to be actuated.

17. Cash-registers under subclass 7 wherein checks or disks or the like are employed for the purpose of registering the sales.

18. Cash-registers under subclass 17 employing a number of balls to register the sales, the balls sometimes being superposed in a transparent tube, the tube or the casing bearing graduation, so that the number corresponding to a column of any height may be ascertained from inspection, or the balls may be employed in various other ways.

SEARCH THIS CLASS, SUBCLASS-
68, for ball calculators.
123, for ball indicators.

19. Cash-registers under subclass 7 without keys but having a pointer movable over a dial, the pointer being moved by hand and in or by its movement causing the operation of the various parts of the machine. In this subclass the pointer traveling over the face of the dial serves as the indicator.

20. Cash registers under subclass 19 having a separate indicator.

21. Cash-registers under subclass 19 wherein a pointer or the like connected to a lever or its equivalent is moved over a graduated scale, the extent of movement determining the operation of the machine by the lever.

22. Mechanism under subclass 7 whereby the drawer of a cash-register is opened or by which it is released so that it may be thrown open by means of a spring normally pressing against it; also, any mechanism whereby the drawer is operated in any way.

23. Mechanism under subclass 7 for operating or for causing to be operated the indicators of a cash-register.

24. Subject matter under subclass 23 comprising shutters or screens and operating devices therefore, whereby the figures on the indicators are obscured during part of the operation of the machine.

SEARCH CLASS-
222, Dispensing, subclass 24, for registers with shutters claimed in combination with significant dispensing features.

25. Devices under subclass 23 for causing the dropping of the tablets of a cash-register after they have been displayed.

26. Devices under subclass 7 for preventing the simultaneous operation of two or more keys or for preventing the operation of more than a predetermined number of keys.

27. Devices under subclass 7 for locking the keys of a cash-register or other calculating machine against movement--as, for example, when the proprietor leaves the machine for a time and does not wish it operated during his absence.

SEARCH THIS CLASS, SUBCLASS-
130, for register locking means in general.

SEARCH CLASS-
197, Typewriting Machines, subclass 107, for typewriter key locks.

28. Subject matter under subclass 7 comprising registers that count or indicate the number of times the lid or cover of a cash-register has been opened.

29. Fare-registers under subclass 33 including two or more separate registers for indicating different classes of fare, whether such registers are entirely independent of each other or whether they have either a common trip-register or a common totalizer.

30. Devices under subclass 33 attached to a cab or other vehicle, adapted to be actuated either by a time-train or according to the distance traveled, at the option of the passenger, the connection being made by the driver, said device indicating to the passenger the time or distance and the amount of fare he is to pay for such time or distance.

31. Structures upder subclass 33 containing a roll of tickets, one of which, either punched or not, is withdrawn and given to each passenger and at the same time is counted upon a register.

32. Fare-boxes under subclass 33 for street-cars etc., containing a register operated by the fare or the ticket or during the operation of the box to cause the fare to be dropped from one part to another.

SEARCH THIS CLASS, SUBCLASS-
100, for coin registering boxes.

33. Subject matter under the class definition comprising machines employed in street-cars, operated by the conductor when taking fares and serving to indicate and register the number of fares taken. These machines include an operating-lever or its equivalent actuated by cords or rods accessible from any point of the car, registers, trip or total, or both, alarm devices, and various auxiliary devices, mainly for the purpose of preventing the conductor "beating" the machine.

34. Fare-registers under subclass 33 whose trip-register is a pointer moving around a graduated dial and whose totalizer is composed of a series of cylinders placed side by side.

35. Fare-registers under subclass 33 whose registering devices are belts or short flat links forming endless chains, upon which the numbers are placed.

36. Fare-registers under subclass 33, having a plurality of registers located on axes parallel with each other.

37. Fare-registers under subclass 36 having two sets of registering devices, as for trip and total, each set composed of a number of cylinders placed side by side.

38. Fare-registers under subclass 36 whose registering devices, whether in one set only or in two sets--trip and total--are composed of a number of pointers, each moving around a graduated dial, the pointers of each set in the higher orders being actuated one graduation when the pointer or the lower order has made a complete rotation.

39. Fare-registers under subclass 36 including one or more sets of registering devices, each set composed of disks numbered upon their faces, the numbers showing successively through an aperture in the casing as the disks are rotated, the disks of lower orders transferring to those of higher orders as they make complete rotations.

40. Fare-registers under subclass 33 having one or more registers arranged on a single axis.

SEARCH THIS CLASS, SUBCLASS-
34, for similarly arranged dial and cylinder fare registers.

41. Fare-registers under subclass 40 whose registering devices comprise a plurality of disks numbered on their faces and placed concentrically upon a single shaft or axis.

SEARCH THIS CLASS, SUBCLASS-
78 and 116, for other single axis, concentric disk devices.

42. Fare-registers under subclass 40 whose registering devices are composed of a series of drums placed side by side upon a single shaft. In some cases these drums are arranged in two sets, a trip and total, the sets being separated from each other.

SEARCH THIS CLASS, SUBCLASS-
34 and 37, for other cylinder type fare registers.

43. Fare-registers under subclass 40 wherein the registering attachment comprises one or more hands moving over a dial and arranged around the same axis in a manner similar to the hour and minute hands of a clock, but ordinarily actuated step by step.

44. Devices under subclass 33, other than the internal mechanism of a fare-register, for operating the same.

45. Operating devices under subclass 44 for fare-registers composed partly of electrical circuits, cut-offs, etc.

46. Subject matter under subclass 44 comprising registering ticket-punches and the like.

47. Devices under subclass 33 by which the trip-register of a fare-register is set back to zero at the beginning of a trip.

(1) Note. This subclass, while similar to subclass 144, in one respect (restoring the register-wheels to zero) differs from it in that while such restoration is going on various other operations are or may be performed-such as locking the machine against movement, setting the trip or direction indicator, moving a zero-register, etc.

48. Subject matter under subclass 47 comprising devices in a fare-register for indicating the direction the car is moving and mechanism for actuating the same.

49. Subject matter under subclass 33 comprising additions to the trip-register of a fare-register by which its capacity is increased.

50. Voting-machines under subclass 51 having a device for recording upon a strip of paper or its equivalent the number of votes cast. The machine may or may not also have a registering attachment.

51. Machines under the class definition employed for mechanically casting and counting votes. These machines usually comprise keys or equivalents, one for each candidate, and in most cases a key whereby by a single movement a vote can be given for the entire set of candidates of either part, interlocking mechanism for preventing votes being given for more than the proper number of candidates, and various auxiliary devices.

52. Voting machines under subclass 51 by means of which legislators or members of assemblies can, by operating keys or levers, indicate a "yes" and "no" vote, these devices frequently having registers connected therewith for counting up the totals of such votes. In many cases these devices are connected with the desks of the legislators.

53. Voting machines under subclass 51 wherein a check or ball is employed to operate the registering device.

54. Voting-machines under subclass 51 wherein the movement of the key sets in position for further operation certain parts, the operation of such parts and through them the registers, etc., being effected by means of a device afterwards operated, such as the door of the booth which is operated by the voter when he departs, etc.

55. Voting-machines under subclass 51 wherein the registering is effected by the direct action of the keys or levers.

56. Voting-machines under subclass 51 whereby the votes are marked upon "Australian ballots" are enabled to be rapidly counted.

SEARCH THIS CLASS, SUBCLASS-
61.6+, for record controlled calculating machines.

57. Ballot-boxes under the class definition having attachments for registering the number of ballots placed therein.

58. Calculators under subclass 61 which contain adding or other calculating mechanism and devices for recording the numbers set up or the results, or both.

SEARCH THIS CLASS, SUBCLASS-
50, 61.9 and 61.1, see subclass 60 below.

59. Recording calculating-machines under subclass 58, where the actuation of the key directly operates the registering and recording devices.

60. Recording calculating-machines under subclass 58 where the depression of a key sets certain devices in position and a succeeding movement of another part, as a handle or lever, operates the machine.

SEARCH THIS CLASS, SUBCLASS-
50, for recording voting machines.
59, for recording calculating machines wherein the depression of a key directly operates the registering and recording devices.
61.9 and 61.1, for recording calculating machines controlled by the sensing of data representing indicia on a record.

SEARCH CLASS-
95, Photography, subclass 4.5, for devices wherein recording is effected by photographing selected characters on a movable member or members, when such devices are disclosed without calculating structure or are not claimed in combination with significant calculating structure of the type provided for in class 235.
101, Printing, subclasses 2, 19+ and 93+, for mechanism for concurrently printing a plurality of characters, when such printing mechanism is disclosed without calculating structure or is not claimed in combination with significant calculating structure of the type provided for in class 235.
197, Typewriting Machines, for digit-by-digit printing mechanism, when disclosed without calculating structure or when not claimed in combination with significant calculating structure of the type provided for in class 235.
234, Selective Cutting (e.g., Punching), appropriate subclasses, for manually controlled mechanism which records by selectively punching a sheet or web, wherein no calculating machine is included.

60.11. Subject matter under subclass 60 wherein the recording is effected by other than printing or punching means. This subclass receives calculators provided with photographic recording means.

SEARCH CLASS-
95, Photography, subclass 4.5 (see subclass 60 above).

60.12. Subject matter under subclass 60 comprising a typewriter combined with a calculator, wherein the two units are each of substantially standard construction and are capable of separation and independent use. These machines are generally characterized by the presence of separate and complete keyboards for each unit and the provision of locking and interlocking devices controlling the operation of the two units and/or interconnections between the typewriter keys and calculator keys, or differential actuators, to eliminate duplication in indexing amounts. This subclass receives a combined machine of the type defined even though it may have a platen common to the typewriting mechanism and to separate printing mechanism in the calculator.

SEARCH THIS CLASS, SUBCLASS-
59, for typewriter calculating machines, wherein digital entries are effected in a totalizer by or with the operation of numeral keys of the typewriter.
60.38+, for typewriter calculating machines, wherein the typewriter keys control typing in the usual fashion, but digital values are set up in indexing mechanism under control of the typewriter numeral keys and are entered concurrently in a plurality of orders of the totalizing mechanism after the completion of a multi-digit typing operation.

60.13. Subject matter under subclass 60 provided with a plurality of distinct recording means for recording on different portions of the same record receiving medium or for recording on different record receiving mediums.

60.15. Subject matter under subclass 60 comprising devices for recording other than numerical data.

60.16. Subject matter under subclass 60.15 in which alphabetical data is recorded. The alphabetical recording elements may be mounted on a member which also carries numerical recording elements or on separate members, as in a typewriter calculator. This subclass only receives typewriter calculators where some feature peculiar to alphabetical printing is claimed in combination with subject matter under subclass 60.

SEARCH THIS CLASS, SUBCLASS-
60.38+, see subclass 60.12 above.

60.17. Subject matter under subclass 60.15 in which the recorded data comprises signs or characters for indicating the zeroizing or clearing of a totalizer or totalizers. This subclass receives devices for indicating totalizer clearance by printing in a distinctive color.

SEARCH THIS CLASS, SUBCLASS-
144, for zero setting or totalizer clearing devices per se, or when combined with means for signalling the clear condition of a totalizer.

60. 18. Subject matter under subclass 60. 15 in which the recorded data comprises distinctive characters or symbols for the purpose of indicating the nature of some phase of a calculating operation. These characters or symbols may be indicative of the totalizer or totalizers selected for entering or total taking operations, the nature of an entering operation, as addition or subtraction or the positive or negative condition of the amount standing in a totalizer, etc.

60. 19. Subject matter under subclass 60 wherein recording is effected in a distinctive color, as by shifting a multicolor ribbon.

SEARCH THIS CLASS, SUBCLASS-

60. 17, for mechanism for recording distinctive characters for indicating the zeroizing or clearing of a totalizer.

60. 18, for mechanism for recording distinctive characters for the purpose of indicating the nature of some phase of a calculating operation, other than clearing a totalizer.

60. 2. Subject matter under subclass 60 comprising mechanism for controlling the recording means to record the true total from totalizer or result receiving elements which contain a negative or overdraft amount, as a result of the subtraction of an amount or amounts which exceed the total of positive or additive entries therein, or such means as is necessarily incidental to a true negative total recording operation.

60. 22. Subject matter under subclass 60. 2 in which electrical means are employed for reading the total from the totalizer or result receiving elements or in controlling the elements which record the true negative total.

60. 23. Subject matter under subclass 60 comprising devices for selectively splitting a continuous series of printing devices into distinct and separately operating sections, generally by rendering the zero print controlling devices ineffective at the point at which splitting is effected.

SEARCH THIS CLASS, SUBCLASS-

60. 28, for devices for controlling zero recording in the operation of gang recording mechanism.

60. 24. Subject matter under subclass 60 including devices for causing the printing of a total by a greater number of printing elements than are employed in printing the items which are entered to form the total. Such devices are employed where overflow orders of the totalizer extend beyond the printing elements which are allocated to and are operative in item printing operations, and it is necessary to call additional printing elements into operation during total taking operations to print a total under control of these overflow orders.

60. 25. Subject matter under subclass 60 comprising means to disable or render ineffective the recording mechanism, whereby an amount may be entered into the calculator without being recorded. These controls are of the type usually known as "non-print" devices.

60. 26. Subject matter under subclass 60 comprising means to disable or render ineffective the mechanism for entering amounts into the register or totalizing means, whereby an amount may be recorded without being entered into the calculator.

60. 27. Subject matter under subclass 60 wherein a plurality of recording elements are selectively positioned in an operation and a common operator is subsequently effective to cause recording from each of said positioned elements.

60. 28. Subject matter under subclass 60. 27 comprising devices for controlling the recording of zeros in orders in which no significant digit appears.

(1) Note. These devices are usually controlled by a higher order recording element which is positioned to record a significant digit, to cause zero recording by adjacent lower elements in which no such digit appears and to suppress zero recording from recording elements in orders above the order in which the highest significant digit appears.

(2) Note. This subclass receives manually settable devices in machines of the type provided for in subclass 60. 27 for enabling or suppressing zero recording, whether in combination with the automatic devices mentioned in (1) Note or not.

60. 29. Subject matter under subclass 60. 27 in which recording is effected by punching.

SEARCH THIS CLASS, SUBCLASS-
61. 1, for mechanism for recording by punching when claimed in combination with record controlled calculating structure.

SEARCH CLASS:
234, Selective Cutting (e.g., Punching), appropriate subclasses, and particularly subclass 91, for selective recording mechanism which comprises successively selected and simultaneously actuated cutting tools.

60. 3. Subject matter under subclass 60. 27 comprising total taking means for positioning recording elements in accordance with the settings of totalizer or result receiving elements, and such mechanism as is necessarily incidental thereto.

SEARCH THIS CLASS, SUBCLASS-
2+, for means for taking totals from a totalizer in a cash register.
50, for means for taking totals from the counters in a voting machine.
60. 39+, for total taking means of the digit-by-digit recording type.
61. 9 and 61. 1, for means for taking totals in record controlled calculators.

60. 31. Subject matter under subclass 60. 3 wherein the recording elements are positioned by restoring the result receiving or totalizer elements to their zero position.

SEARCH THIS CLASS, SUBCLASS-
144, for zero-setting or totalizer clearing devices per se.

60. 32. Subject matter under subclass 60. 31 comprising devices for avoiding the blank cycle which is necessary in many types of calculating machines in order to condition the totalizer or other calculating structure for a total reading operation. These blank cycles are usually necessary in order to restore tripped tens carry devices to their normal positions.

60. 33. Subject matter under subclass 60. 3 wherein the recording elements are positioned by sensing the totalizer or result elements or under control of devices which sense said totalizer or result elements. This subclass receives total sensing devices wherein the feelers are permanently engaged with the result elements.

60. 34. Subject matter under subclass 60. 33 comprising mechanism for restoring the totalizer or result elements to their zero positions after the total sensing operation.

SEARCH THIS CLASS, SUBCLASS-
144, for zero-setting or totalizer clearing devices per se.

60. 35. Subject matter under subclass 60. 3 wherein the selection of recording elements, or operative portions thereof, which effect recording, is controlled by impulses which are differently timed; that is, the relative timing of the controlling impulses determines the digits which are to be recorded. The differentially timed impulses are usually electrical in nature, as in electrical record controlled calculating machines. However, this subclass receives mechanical machines wherein recording elements are selected by mechanically operated means which are operated at differential times.

SEARCH THIS CLASS, SUBCLASS-
61. 9 and 61. 1, for printing and punching devices, respectively, which are operated by differentially timed impulses, when claimed in combination with record controlled calculating structure.

60. 37. Subject matter under subclass 60. 3 in which a total or result is recorded by taking a direct impression from a totalizer or result element, or from a recording element directly coupled thereto.

60. 38. Subject matter under subclass 60 comprising recording means of the type wherein one digit is recorded at a time and escapement of the device which carries the record medium permits successive recording.

This subclass receives typewriter computing means of the type wherein the typewriter keys control typing in the usual fashion. In addition, the numeral keys, by means of carriage controlled devices, cause the values of digital characters typed to be successively set up in an indexing mechanism, which mechanism controls entry of said set up values concurrently into a plurality of totalizer orders upon the completion of a multi-digit typing operation.

Where denominational selection of the indexing or digit receiving set up means is claimed, classification is in this subclass or indented subclasses.

SEARCH THIS CLASS, SUBCLASS-
60. 41+, for carriage control features, other than denominational selection, particularly subclass 60. 47+.

SEARCH CLASS:
234, Selective Cutting (e.g., Punching), appropriate subclasses, for a selective step-by-step punching device, and particularly subclass 120+ for input means for such a device which may involve calculating machine structure.

60. 39. Subject matter under subclass 60. 38 comprising total taking means for selecting digit recording elements in accordance with the settings of a totalizer or result receiving elements, and such means as is necessarily incidental thereto.

SEARCH THIS CLASS, SUBCLASS-
60. 3, for gang recording means combined with total taking structure.

60. 4. Subject matter under subclass 60. 39 in which the total taking means is controlled, at least in part, by electrical means.

60. 41. Subject matter under subclass 60 comprising a carriage which carries the paper or other medium upon which recording is effected and is so movable as to cause recording upon different portions of the record receiving medium.

SEARCH THIS CLASS, SUBCLASS-
60. 38+, for carriage controlled selection of the successive denominational orders into which digital entries are effected.

60. 42. Subject matter under subclass 60. 41 comprising devices for controlling feeding or positioning of the carriage.

60. 44. Subject matter under subclass 60. 42 comprising mechanism for moving the carriage back and forth, or shuttling it, between two positions.

60. 45. Subject matter under subclass 60. 42 comprising power means, other than the usual spring means, for moving the carriage from one position to another.

60. 46. Subject matter under subclass 60. 42 comprising means for selectively positioning the carriage at various columnar positions.

60. 47. Subject matter under subclass 60. 41 comprising means controlled by the position of the carriage for controlling various functions of the machine.

60. 48. Subject matter under subclass 60. 47 for selecting a totalizer or totalizers for either item entering or total taking operation.

The totalizer selection means may be combined with means for controlling the nature of an entering operation and may effect totalizer selection by enabling or disabling totalizer actuating or item receiving mechanism.

60. 49. Subject matter under subclass 60. 47 for controlling devices for locking various machine elements or for controlling interlocks between various elements of the machine.

60. 5. Subject matter under subclass 60. 47 comprising structures or elements, which are carried by the carriage for operating some machine control mechanism.

60. 51. Subject matter under subclass 60 comprising means for controlling operation of the platen or paper feeding mechanism.

60.52. Subject matter under subclass 60 comprising means controlled by the platen or paper feeding means for controlling various functions of the machine.

61. Subject matter under the class definition comprising calculating-machines. In this group are classified machines for mechanically performing the various mathematical operations, usually those of addition or subtraction, frequently that of multiplication, and occasionally of division. These machines generally comprise registers and keys or equivalents for operating them, together with necessary auxiliary devices.

SEARCH CLASS-
33, Geometrical Instruments, for means for calculating unknown functions of geometrical figures, said means having members designed to form representations of said figures.
73, Measuring and Testing, subclass 206, for integrating means combined with flow meter structures.
177, Weighing Scales, subclass 25+ for a weigher with means making a calculation using a weight evaluation by the weigher as a factor.
315, Electric Lamp and Discharge Devices, Systems, subclass 8.5+ for cathode ray tube systems responsive to electrical pulses for counting or storing such pulses, or for translating such pulses from one code to another code, and subclass 84.5 for electrical pulse counting or storing circuits employing gaseous space discharge devices.
333, Wave Transmission Lines and Networks, subclass 19 for differentiating or integrating networks of the passive type.

61.1. Machines under subclass 61.6 combined with mechanism for punching the data set up or the results, or both.

SEARCH CLASS:
83, Cutting, subclass 71 for a record-controlled cutting or punching machine
234, Selective Cutting (e.g., Punching), subclass 59+, for a record-controlled selective punching machine.

61.11. Subject matter under subclass 61.6 comprising mechanisms for sensing or analyzing data on a record which are peculiarly adapted for use in controlling record controlled calculating machines or those analyzing mechanisms capable of general application in record controlled statistical machines.

(1) Note. Record sensing or analyzing mechanisms are employed in combination with various art machines. Attention is called to the following classes:
66, Textiles, Knitting, particularly subclass 154.
73, Measuring and Testing, subclass 156.
84, Music, subclass 115+.
87, Textiles, Braiding, Netting and Lace Making, subclass 14+.
101, Printing, pricipally subclasses 2, 19, 20, 93 and 96.
112, Sewing, subclasses 4 and 84.
139, Textiles, Weaving, subclasses 317 and 331.
178, Telegraphy, subclass 3+.
197, Typewriting Machines, subclass 20.
199, Type Casting, subclasses 74 and 77.
200, Electricity, Circuit Makers and Breakers, subclass 46.
209, Classifying, Separating and Assorting Solids, subclass 110.
234, Selective Cutting (e.g., Punching), subclass 59+.
276, Type Setting, subclass 13.
340, Communications, Electrical, appropriate subclasses, particularly subclass 339.

61.12. Subject matter under subclass 61.6 comprising record means per se, such as cards, plates, strips or sheets, employed in record controlled statistical machines.

SEARCH CLASS-
129, Paper Files and Binders, subclass 16.1, for analogous cards in selective index systems.
178, Telegraphy, subclass 111+, for similar tapes employed in telegraphic apparatus.
234, Selective Cutting (e.g., Punching), subclass 59+ for a record-controlled selective cutting device, and particularly subclass 89, indented thereunder, for a pattern or record usable with such a device.

61.5. Mechanisms under subclass 61 capable of rapidly solving those mathematical problems pertaining to the training of ordnance upon targets in air, on land and in water, where the accurate setting of the gun is dependent on the results of solution of problems involving range, rate of change of range, relative velocities, acceleration, azimuthal and zenithal angular positions and rate of change thereof, time of flight and drift of projectile, corrections for wind, etc.

SEARCH CLASS-
33, Geometrical Instruments, subclasses 46.5 and 49, for computing devices wherein factors are set in and a telescope or other sight is automatically positioned in accordance with the computed result, e.g., bomb and gun sights.
89, Ordnance, subclass 41, for computers combined with gun-controlling mechanisms.

61.5. Mechanisms under subclass 61 capable of rapidly solving those mathematical problems pertaining to the training of ordnance upon targets in air, on land and in water, where the accurate setting of the gun is dependent on the results of solution of problems involving range, rate of change of range, relative velocities, acceleration, azimuthal and zenithal angular positions and rate of change thereof, time of flight and drift of projectile, corrections for wind, etc.

SEARCH CLASS:

33, Geometrical Instruments, subclass 229, for a bomb sight including computing device wherein factors are set in and a telescope or other sight is automatically positioned in accordance with the computed result and subclass 237+, for a gun sight including a similar computing device.

89, Ordnance, subclass 41, for computers combined with gun-controlling mechanisms.

61.6. Machines under subclass 61 controlled by the sensing or analyzing of data from a record.

Record controlled calculating machines combined with sorting mechanisms are included in this group.

SEARCH THIS CLASS, SUBCLASS-
56, for vote counting machines responsive to punched or otherwise marked ballots.

61.7. Machines under subclass 61.6 having a control or controls dependent upon comparison of two or more sets of data which may be carried upon record cards, accumulators or other entry receiving devices.

SEARCH CLASS-
73, Measuring and Testing, subclass 156, for statistical card verifying machines which compare two sets of data.

61.8. Machines under subclass 61.6 comprising means for performing subtraction.

61.9. Machines under subclass 61.6 combined with mechanism for printing the data set up or the results, or both.

SEARCH CLASS-
101, Printing, principally subclasses 2, 19, 20, 93 and 96, for record controlled printing devices wherein no calculating machine structure is included.

62. Calculating-machines under subclass 61 wherein the pressing of a key releases a spring or other motor which actuates the devices to the extent determined by the value of the key operated.

SEARCH THIS CLASS, SUBCLASS-
11, for motor operated cash registers.

63. Calculating-machines under subclass 61 having a single set of keys and having devices movable from order to order of the registering mechanism and connecting the keys successively therewith.

64. Subject matter under subclass 61 comprising devices attached to a pencil or similar instrument which are employed to keep account of the sum of columns to be added or the number of tens to be "carried", usually operated by the pressure of the point upon the paper or desk.

Adding devices that are merely adapted to be clamped to a pencil, but do not form part thereof and are not operated by the movement of the pencil, are not classified herein, but are classified according to the structure of the adding device itself.

64.3. Subject matter under subclass 61 comprising devices either in conjunction with a logarithmic calculator or apart from such calculator, which devices have a scale or scales to determine the location of a decimal point in a calculation.

64.7. Calculators under subclass 61 having movable members variably positionable with respect to one another, at least one of said members having an index or scale positionable opposite a point on a scale on the other member and there being at least one scale having values peculiar to the art of photography.

65. Subject matter under subclass 61 comprising adding-machines having two parts, a bar and a disk, one part being for the lower orders and the other for the higher.

66. Subject matter under subclass 61 comprising adding-machines having two parts, a cylinder and a disk, or a plurality of either.

67. Subject matter under subclass 61 comprising adding-machines wherein the numbers are arranged spirally, either around the surface of a cylinder or upon the face of a disk, there ordinarily being a pointer or its equivalent that travels in cooperation with the cylinder or disk in order to indicate the proper figure or number.

SEARCH THIS CLASS, SUBCLASS-
107, for spiral registers.

68. Calculators under subclass 61 wherein the registering devices are composed of balls.

SEARCH THIS CLASS, SUBCLASS-
18 and 123, for other ball devices.

69. Calculating devices under subclass 61 wherein a bar or bars bearing numerals are employed instead of disks or cylinders.

70. Subject matter under subclass 69 comprising rules consisting of a stationary base, and one or more slides movable therein, both the base and the slides being graduated, usually logarithmically, according to the different elements of some mathematical formula, so that by placing the slide in proper relation to the base, problems embodying such formula may be solved without calculation.

SEARCH THIS CLASS, SUBCLASS-
79.5 and 84, for other types of slide rules.

71. Calculating-machines under subclass 61 wherein movable belts bearing numerals are employed instead of cylinders or disks.

Machines wherein belts are employed as devices whereby to operate registering or calculating cylinders, etc., are not classified herein, but are located according to the character of the registering mechanism.

72. Calculating-machines under subclass 61, wherein the registering devices are placed upon axes parallel with each other.

73. Calculating-machines under subclass 72 whose registering attachments comprise cylinders placed either singly or in sets on axes parallel with each other.

74. Calculating-machines under subclass 72 whose registering attachments comprise disks placed upon axes parallel with each other, the disks being actuated by some instrument held in the hand, such as a stylus, pencil, etc.

75. Calculating-machines under subclass 74, wherein the disks are each operated by means of keys.

76. Calculating-machines under subclass 72 whose registering devices are on axes parallel with each other, these devices being connected by gears instead of by intermittent transfer mechanism.

77. Calculators under subclass 61, whose registering devices are placed upon the same axis.

78. Calculating-machines under subclass 77 whose registering devices comprise a plurality of disks numbered on their faces and mounted in a base, said disks being placed concentrically on a single shaft or axis.

SEARCH THIS CLASS, SUBCLASS-
41 and 116, for other concentric disk devices.

79. Calculating machines under subclass 77, whose registering devices are composed of cylindrical members mounted for rotation on a common axis.

79.5. Calculating devices under subclass 79 wherein two or more relatively movable cylindrical members are so graduated, usually logarithmically according to the elements of some mathematical formula, that by placing one in proper relation to another problems involving such formula may be solved.

SEARCH THIS CLASS, SUBCLASS-
70, for bar slide rules.
84, for disk slide rules.

80. Calculators under subclass 79 whose registering devices comprise cylinders placed upon a single axis, these cylinders being operated directly by means of the fingers of the operator or by a stylus, pencil, or other instrument held in the hand.

81. Calculators under subclass 80 whose registering devices comprise cylinders placed side by side upon a single axis, these cylinders being operated by levers or equivalents having handles or the like movable to different extents over a graduated plate.

82. Calculating-machines under subclass 79 having registering devices composed of a series of cylinders placed side by side upon a common shaft and being directly operated by the depression of keys, with which the machine is provided.

83. Calculators, under subclass 77 whose registering devices comprise a rotatable disk mounted on a base, or one or more hands or pointers movable over the face of a dial properly graduated.

84. Subject matter under subclass 83 comprising slide rules, as defined in subclass 70 wherein the base and the slides instead of being straight are circular.

SEARCH THIS CLASS, SUBCLASS-
70 and 79.5, for other types of slide rules.

85. Calculators under subclass 61 comprising a table showing results calculated from certain data so arranged that by properly manipulating the same any desired result is obtained.

SEARCH CLASS:
177, Weighing Scales, subclass 34+ for a tabular type computer combined with a weigher.

86. Tabular calculators under subclass 85 having the tables placed upon belts which are movable back and forth, as desired.

87. Tabular calculators under subclass 85 having tables formed or placed upon cylinders.

88. Tabular calculators under subclass 85 having tables placed upon disks which rotate about their centers.

89. Tabular calculators under subclass 85 having tables placed upon sheets, the sheets being attached to a frame either permanently or temporarily and a guiding-strip or the like being provided to be used in connection with the sheets.

90. Subject matter under the class definition comprising boards such as cribbage boards and the like, for tallying purposes, the tallying being accomplished by means of pegs or the like successively moved to different holes as the tally increases.

SEARCH CLASS-
116, Signals and Indicators, subclass 136, for similar peg type indicators.

91. Subject matter under the class definition comprising devices for operating registers, the specific construction of the registers not being of the invention.

SEARCH THIS CLASS, SUBCLASS-
56 and 61.6+, for record controlled operating devices for registering mechanisms.

92. Subject matter under the class definition comprising devices in which the register is operated through the medium of electrical devices.

SEARCH THIS CLASS, SUBCLASS-
56 and 61.6+, for electrically operated record controlled registering mechanisms.

SEARCH CLASS-
246, Railway Switches, and Signals, subclasses 19, 77-80 and 247, for similar actuating devices.
307, Electrical Transmission or Interconnection Systems, subclass 88.5 for transistor or non-linear conductor devices forming electrical pulse counting circuits or chains and not elsewhere classifiable.
315, Electric Lamp and Discharge Devices, Systems, subclass 8.5+ for cathode ray tube systems forming electrical pulse counting circuits, and subclass 84.5+ for similar electrical pulse counting circuits utilizing gaseous space discharge devices.
317, Electricity, subclass 140 for electrical pulse responsive plural electromagnetic relay systems of the sequentially operated type and which may form counting chains.
328, Miscellaneous Electron Space Discharge Device Systems, subclass 41+ for commutating and electrical pulse counting circuit employing electron space discharge tubes not elsewhere classified.
340, Communications, Electrical, subclass 168 for selective electrical signaling systems of the pulse responsive type having means for counting the number of pulses received (e.g., relay chain) and subclass 361+ for common digit type pulse counters which constitute an element of a pulse code transmitter.

93. Subject matter under the class definition comprising registers connected with and operated by a turnstile.

94. Subject matter under the class definition comprising registers operated by means of a faucet or other part through or in which the fluid passes, such as registering-faucets, registers connected with saucers holding beer-glasses, registering bottles, etc.

95. Subject matter under the class definition comprising registers connected or attached to the wheel or axle of a vehicle, such as a carriage or bicycle, for the purpose of counting the number of revolutions made by the wheel and, with the knowledge of the size of the wheel, of measuring the distance traveled, the counting-wheels being marked to indicate the distances instead of the number of revolutions.

SEARCH CLASS:
73, Measuring and Testing, subclass 490 for an odometer combined with a speedometer.

96. Subject matter under subclass 95 comprising details or isolated parts of odometers or parts connected therewith, such as tappets, brackets, etc.

97. Odometers under subclass 95 having two sets of registering devices, one set moving continuously to indicate the entire distance traveled and the other set capable of being reset to zero at any desired time and adapted to indicate the distance traveled during a single trip or in a day or any desired interval of time.

98. Subject matter under the class definition comprising registers operated by a package, barrel, etc., passing through the machines.

SEARCH CLASS-
198, Conveyers, Power Driven, subclass 40, for conveyor organizations including broadly claimed counters.
221, Article Dispensing, subclass 7 for plural article dispensing organizations not otherwise provided for, including dispenser operated register structures.

99. Subject matter under the class definition comprising registers operated through the medium of a depressible seat, platform, or the like on which the person sits or steps or the article is placed.

100. Subject matter under the class definition comprising registers operated by a coin as it passes into a box or other receptacle.

SEARCH THIS CLASS, SUBCLASS-
32, for similar fare or ticket registers.

101. Subject matter under the class definition comprising registers operated by the hand-stamp or by postage stamp dispensing or printing mechanisms.

102. Subject matter under the class definition comprising devices for counting the number of words etc., written by a typewriter.

SEARCH CLASS:
234, Selective Cutting (e.g., Punching), subclass 4+, for a keyboard operated selective punching machine provided with an inter-word-space counter.

103. Subject matter under the class definition comprising instruments for counting the number of rotations made by a shaft or other piece of machinery.

103.5. Subject matter under subclass 103 comprising instruments for comparing the number of rotations made by two or more shafts or other pieces of machinery.

104. Subject matter under subclass 103 comprising instruments or machines for counting or indicating the number of rotations in a given time made by a shaft or other piece of machinery--as, for example, the number of rotations per second or minute or even the number of miles per hour made by a moving vehicle.

SEARCH CLASS:
73, Measuring and Testing, subclass 488+ for speed sensing mechanism for producing similar indications.

105. Subject matter under the class definition comprising instruments attached to the foot or body for counting the number of steps made; also, devices for analogous purposes.

106. Subject matter under the class definition comprising machines having several registering devices placed on axes at angles to each other.

107. Subject matter under the class definition comprising registers wherein the numbers are arranged spirally, either around the surface of a cylinder or upon the face of a disk, a pointer being sometimes employed which travels along the cylinder or disk in order to indicate the proper numeral.

SEARCH THIS CLASS, SUBCLASS-
67, for spiral calculators.

108. Subject matter under the class definition comprising registers, counting devices on axes parallel with each other.

109. Registers under subclass 108 whose counting devices are connected by gearing instead of intermittently-operating transfer mechanism.

110. Registers under subclass 108 whose counting devices comprise several cylinders or drums.

111. Registers under subclass 108 whose counting devices include both graduated movable disks and pointers passing over graduated dials.

112. Registers under subclass 108 whose counting devices include several graduated dials over whose surfaces pass pointers or hands.

113. Registers under subclass 108 whose counting devices include a plurality of rotatable disks having numbers on their faces.

SEARCH THIS CLASS, SUBCLASS-
111, for dial and disk registers.

114. Registers under subclass 113, the disks being separately operated by hand. These registers are generally used in keeping count of the points made in games.

115. Subject matter under the class definition comprising registers whose counting devices are placed upon a single axis.

116. Registers under subclass 115 whose counting devices comprise a plurality of disks numbered upon their faces and mounted on a base, said disks being placed concentrically upon the shaft or axis.

SEARCH THIS CLASS, SUBCLASS-
41,and 78, for other concentric disk devices.

117. Registers under subclass 115 whose counting devices comprise a plurality of cylinders placed side by side upon the shaft or axis.

118. Registers under subclass 117 whose counting devices comprise a single cylinder numbered on its periphery.

119. Registers under subclass 115 whose counting devices comprise two or more cylinders, the cylinders having connected or formed therewith gears having different numbers of teeth, but actuated by the same gear, thus causing a slow movement of one cylinder with respect to the other.

120. Registers under subclass 115 whose counting devices comprise several pointers or hands moving over a dial and turning around the same axis at different rates of speed, the relative movements being continuous, as when connected by gears or pinions in the same way as the hands of a watch, or intermittent, as when caused by transfer devices operating only when one hand has completed a rotation.

121. Registers under subclass 115 whose counting devices comprise a graduated dial and a single hand or pointer moving thereover.

SEARCH THIS CLASS, SUBCLASS-
103, for similar registers in rotation counters.

122. Registers under subclass 115 whose counting mechanism comprises a rotating disk having numbers on its face.

123. Subject matter under the class definition comprising counting devices where balls, buttons or push buttons movable upon a support are employed to count or keep tally of a game--such, for instance, as billiards.

SEARCH THIS CLASS, SUBCLASS-
18, 68 and 123, for other ball devices.
90, for peg tally boards.

124. Subject matter under the class definition comprising registers embodying a pointer moving along a graduated bar.

125. Subject matter under the class definition comprising registering-machines wherein the registering elements are movable belts bearing numerals.

127. Subject matter under the class definition comprising devices for keeping count of the points in a game or for equivalent purpose, comprising indicators pivoted to a base and adapted to be turned on their pivots--as, for example, from a horizontal to a vertical position--to indicate the desired data.

SEARCH CLASS-
116, Signals and Indicators, subclass 134, for analogous pivoted indicators.

128. Subject matter under the class definition comprising mechanism connected to registering devices of any character for sounding an alarm, as by ringing a bell or in any other manner.

SEARCH CLASS-
116, Signals and Indicators, subclass 67+, for other alarms.

130. Subject matter under the class definition comprising devices for positively locking a part against movement, either temporarily until the machine shall have operated to a certain extent or for such a time as the operator may desire.

SEARCH THIS CLASS, SUBCLASS-
27, for devices for locking calculating machine keys against movement.

SEARCH CLASS-
197, Typewriting Machines, subclass 107, for typewriter key locks, and subclass 193, for machine locks.

131. Subject matter under the class definition comprising devices for preventing the accidental movement of a part or for preventing a register-wheel or other moving part from being carried by momentum farther than it should go.

SEARCH CLASS-
74, Machine Elements and Mechanisms, subclass 148+, particularly subclass 152, for such devices per se.

132. Subject matter under the class definition comprising devices under control of a register for effecting either the stoppage of the register, or the starting, stopping, or other operation of apparatus controlled by the register (as the opening or closing of a switch) upon a particular or predetermined reading of the register being obtained.

SEARCH THIS CLASS, SUBCLASS-
47+ and 144, for means to stop the register wheels at zero during resetting.

SEARCH CLASS:
53, Package Making, subclass 52+ for packaging machines having as a part thereof an automatic or triggered control.
93, Paper Manufactures, subclass 93, for similar devices in paper bunching and binding machines.
192, Clutches and Power-Stop Control, subclass 138+, for similarly controlled clutches.
222, Dispensing, subclasses 14+, 27 and 39, for similar devices in dispensing mechanism.
234, Selective Cutting (e.g., Punching), subclass 21, for a selective cutting device with control means operable in response to a predetermined register reading.

133. Subject matter under the class definition comprising devices whereby a register-wheel of higher order is advanced one step each time a wheel of the next lower order has made a complete rotation.

134. Transfer devices under subclass 133 wherein the wheel of lower order has connected therewith or placed thereon a cam or eccentrically-disposed pin acting upon a lever connected with which is a pawl or equivalent that actuates the wheel of higher order.

135. Transfer devices under subclass 133 wherein the register-wheels have attached thereto ratchet-wheels, each wheel having one notch deeper than the rest, these notches being of successively-increasing depth in the several wheels, whereby the actuating pawl or pawls are permitted at each complete rotation of a wheel to move one step the wheels of the next higher orders.

136. Transfer mechanism under subclass 133 comprising a pinion or equivalent meshing with gears attached to or connected with two register-wheels the gears having teeth differing in number, so that one moves at a rate different from the other.

137. Transfer mechanism under subclass 133 wherein the complete rotation of a register-wheel sets a device into such a position that by a subsequent movement and by an independent actuating device it is caused to actuate one step the wheel of next higher order.

138. Transfer mechanism under subclass 137 wherein the independent actuating device moves successively from one order to another.

139. Transfer devices under subclass 133 comprising a pinion between each two register-wheels on a shaft parallel to that of said wheels, said pinion being actuated by the gear of one register-wheel and actuating the gear of the wheel of higher order, one of the gears or pinions of the set having a single tooth, so that the wheel of higher order is moved intermittently from one number to the next at each complete rotation of the wheel of lower order.

140. Transfer devices under subclass 133 wherein each register-wheel has a single tooth upon its side (or periphery) which at each complete rotation engages with a ratchet-tooth on the wheel of next higher order, moving it one step.

141. Transfer mechanism under subclass 140 wherein the wheel of higher order is locked from accidental movement when the transfer is not being effected.

142. Transfer devices under subclass 133 comprising a pawl pivoted to and moving with a register-wheel which, when the wheel has completed a rotation, is moved radially with respect to the wheel into engagement with a pin or tooth on the wheel of next higher order for a time sufficient to move the latter one step.

143. Transfer devices under subclass 142 except that the pivoted pawl has a movement transverse to the plane of the register-wheel.

144. Subject matter under the class definition comprising devices by which the register of a calculator, cash-register, or other machine is returned to zero or "cleared out."

SEARCH CLASS-
222, Dispensing, subclass 32+, for registers with zero-setting mechanism claimed in combination with significant dispensing features.

145. Subject matter under the class definition comprising those portions of registers, usually manually actuated, including keys,, shift-keys, space bars, etc., which control and initiate the action of the calculating machine to determine what numbers shall be introduced and how; also to control subsidiary operations of the machine.

SEARCH CLASS:
234, Selective Cutting (e.g., Punching), subclass 123+ for a keyboard associated with a selective cutting machine.

146. Keyboards under subclass 145 which are supported above or otherwise adjacent to the main keyboard of the machine, often for performing some function additional to that of the main keyboard.

150. Device under subclass 61 in which an electric signal having information content forms a component.

SEARCH THIS CLASS, SUBCLASS:
62, for a device which employs an electric motor for actuation of the calculating mechanism.
92, for electrical registers.

150.1 A device under subclass 150 wherein a plurality of signals representing parameters are operated upon to produce an output signal representing a function of the parameters, the device including means to optimize the output.

(1) Note. The device may be connected to control a process or apparatus.

SEARCH THIS CLASS, SUBCLASS:
150.4, for computers of the repetitive or analogue type for deriving a mathematical solution by successive steps.

SEARCH CLASS:
318, Electricity, Motive Power Systems, subclass 561+ for adaptive or optimizing positional servomechanisms utilizing electric motors.

150.2 A device under subclass 150 for controlling a vehicle or for indicating a condition, position, orientation, or course of a vehicle.

(1) Note. This subclass provides for devices used for controlling or indicating a vehicle condition. When the vehicle is nominally claimed classification is here. However, where significant vehicle structure is recited, classification of the combination is in the appropriate vehicle class. The term vehicle as here used includes land vehicles, aircraft, ships and space vehicles.

SEARCH THIS CLASS, SUBCLASS:
151+, for electrical computers associated with external devices other than vehicles.

SEARCH CLASS:
73, Measuring and Testing, subclass 178+ for instruments with particular physical sensing means adapted to use in conducting a vehicle on or through a fluid medium.
244, Aeronautics, subclass 76+ for devices or systems for automatically controlling aircraft along a predetermined course or in response to changing conditions, especially indented subclass 77 for electrical systems for the control of aircraft.
246, Railway Switches and Signals, subclass 27+ for block-signal systems for automatically effecting train control without direct human intervention.
318, Electricity, Motive Power Systems, subclass 648+, for electric motor systems controlled automatically responsive to direction, inclination or angular position of bodies.
340, Communications, Electrical, subclass 22+, for electrical signaling systems adapted to a vehicle or traffic environment or utilized to signal to traffic or vehicles.
343, Communications, Radio Wave, subclass 7+ for reflected wave radio wave systems (radar) utilizing the returned wave for control purposes.
346, Recorders, subclass 8 for course recorders including devices that record deviation from a set course, rudder position, steering wheel position, etc.

150.21 A device under subclass 150.2 for controlling or indicating the efficiency or economy of fuel utilization of the prime mover of the vehicle.

150.22 A device under subclass 150.2 for controlling or indicating the take-off or landing of an aircraft.

SEARCH THIS CLASS, SUBCLASS:
150.23, for devices including electrical computers for control or indications of flight patterns of a plurality of aircraft in a common airspace.

SEARCH CLASS:
73, Measuring and Testing, subclass 179 for craft rate of ascent or descent determining means responsive to atmospheric pressure variations, and subclass 495 for a direction indicator combined with rate of climb device.

244, Aeronautics, subclass 63 for devices or arrangements to assist in the take-off of aircraft from land or water, and subclass 75+ for aircraft control in general, particularly indented subclass 81 for automatic devices operated in response to conditions peculiar to landing of aircraft.

340, Communications, Electrical, subclass 25+ for electrical signaling systems utilized in aircraft or aircraft traffic control systems, e.g., landing beacons, aircraft stall indications, etc.

150.23 A device under subclass 150.2 for controlling or indicating the flight patterns of a plurality of aircraft in a common airspace.

SEARCH THIS CLASS, SUBCLASS:

150.22, for devices including electrical computers for controlling or indicating the take-off or landing of aircraft.

150.24, for devices including electrical computers for controlling or indicating the traffic patterns of a plurality of surface vehicles in a common land or sea area.

SEARCH CLASS:

340, Communications, Electrical, subclass 23+ for vehicle (e.g., aircraft) sequence or position describers, and subclass 26 for airport traffic control electrical signal systems.

150.24 A device under subclass 150.2 for controlling or indicating the traffic patterns of a plurality of surface vehicles on a common ground or on or in a common sea area.

SEARCH THIS CLASS, SUBCLASS:

150.23, for devices including electrical computers for controlling the flight patterns of a plurality of aircraft in a common airspace.

SEARCH CLASS:

246, Railway Switches and Signals, subclass 27 for automatic block signal systems.

340, Communications, Electrical, subclass 23+ for vehicle sequence or position describers, subclass 29+ for nautical vehicle traffic, and subclass 31 for traffic actuated electrical signal systems.

150.25 A device under subclass 150.2 for guidance control or indication, and having inertial force responsive sensing means for furnishing guidance information.

SEARCH CLASS:

33, Geometrical Instruments, subclass 316+ and 318+, for a direction indicator utilizing an inertial device, i.e., gyroscope.

73, Measuring and Testing, subclass 488+, for speed or acceleration determining devices utilizing inertial means, particularly indented subclass 514+, for means responsive to rate of change of speed.

74, Machine Elements and Mechanisms, subclass 5+ for gyroscopes in general, and indented subclass 5.22 for gyroscopes combined with structure other than the gyroscope (e.g., a nominally recited device to be stabilized combined with a specific gyroscope to stabilize the device).

244, Aeronautics, subclass 79 for automatic aircraft control systems of the gyroscope controlled type.

307, Electrical Transmission or Interconnection Systems, subclass 121 for electric switching systems in general controlled by inertial or acceleration force responsive means.

318, Electricity, Motive Power Systems, subclass 640+, for electric motor control systems responsive to direction inclination or angular position of bodies.

323, Electricity, Voltage Magnitude and Phase Control Systems, subclass 72 for impedance systems automatically controlled by inertial or acceleration force responsive means.

346, Recorders, subclass 7 for recorders wherein the record tracer is controlled by an inertial force sensing means.

150.26 A device under subclass 150.2 used to compute, and then to indicate or control, the path or course or direction of travel, or the desired course or direction of travel of a vehicle.

SEARCH THIS CLASS, SUBCLASS:

150.27+, for vehicle position determining devices for indicating or controlling the position of the vehicle.

186+, for electrical computers in general of the trigonometric type.

SEARCH CLASS:
33, Geometrical Instruments, subclass 333, for structurally installed direction indicators.
35, Education, subclass 10.2 for devices for teaching navigation involving simulated course and direction determination of vehicles.
73, Measuring and Testing, for vehicle navigation instruments utilizing physical sensing means.

181, Acoustics, subclass .5 for sonic or supersonic compressional wave devices utilized in seismic surveying, and subclass 26 for sound locating devices.
340, Communications, Electrical, subclass 1+ for sonic or supersonic compressional wave devices for determining the distance, direction or bearing of objects by reflected waves.

343, Communications, Radio Wave, subclass 10+ for radar systems for determining distance and direction, subclass 17 for direction determining radar systems, and subclass 100+ for directive radio wave systems in general.

356, Optics, Measuring and Testing, subclass 138+ for angle measuring by means of light ray diversion.

150.261 A device under subclass 150.26 wherein the course or direction of travel is computed as a great circle on a sphere.

(1) Note. A great circle (on a sphere) is a circle which has its diameter equal to that of the sphere.

SEARCH THIS CLASS, SUBCLASS:
150.271, for devices for indicating or controlling the position of a vehicle relative to a spherical surface.

150.27 A device under subclass 150.2 for indicating or controlling the position of a vehicle, or guiding the vehicle toward a predetermined position.

SEARCH THIS CLASS, SUBCLASS:
150.26+, for computer devices for vehicle course or direction indicating or controlling.
186+, for electrical computers of the trigonometric type.

SEARCH CLASS:
33, Geometrical Instruments, subclass 125, for distance measuring devices; particularly indented subclasses 133, for fabric or cord measuring, 140, for tape measuring, and 142, for rolling contact type, distance measuring devices of the computing type.
35, Education, subclass 10.2 for educational or training devices relating to training or instruction in the operation and characteristics of devices used in navigation for determining the position or course of vehicles.

73, Measuring and Testing, subclass 178+ for navigation instruments utilizing physical sensors for determining position, velocity, bearing or direction of craft.
181, Acoustics, subclass .5 for sound wave type distance or position determining means.

340, Communications, Electrical, subclass 1+ for distance or position determining means of the reflected sonic or supersonic wave type.
343, Communications, Radio Wave, subclass 5+ for reflected or returned radio wave object position determining systems, and subclass 100+ for position determining radio wave systems in general.

356, Optics, Measuring and Testing, subclass 3+ for light ray type range or height finders, subclass 27+ for light ray type velocity or velocity and height measuring instruments and subclass 138+ for angle measuring by means of light diversion.

150.271 A device under subclass 150.27 wherein the position of a vehicle is determined with respect to a spherical surface.

SEARCH THIS CLASS, SUBCLASS:
150.261, for electrical computers wherein the course or direction of travel of a vehicle is computed as the great circle of a sphere.

150.272 A device under subclass 150.27 wherein the position of a vehicle is determined with reference to hyperbolic lines.

SEARCH CLASS:
343, Communications, Radio Wave, subclass 102+ for radio wave beacons for transmitting bearing or position determinative signals, especially indented subclass 103 for isochronic type systems (e.g., Loran type, wherein the difference in time of arrival of synchronized pulses determines position lines which are hyperbolic).

150.3 A device under subclass 150 in which the information is determinable from the pulse repetition frequency of the electric signal.

SEARCH THIS CLASS, SUBCLASS:
152+, for electrical computers employing signals which represent numerical digits.
201, for digital computers utilizing fluid elements.

SEARCH CLASS:
324, Electricity, Measuring and Testing, subclass 78+ for systems for measuring or indicating the frequency of cyclic current or voltage.
328, Miscellaneous Electron Space Discharge Device Systems, subclass 109+ for electron tube systems for selecting pulses on the basis of time or phase relationship between successive pulses.
329, Demodulators and Detectors, subclass 107+ for pulse demodulators responsive to pulse repetition rate or position.
340, Communications, Electrical, subclass 348 for code transmitters of the adjustable permutation pulse type.

150.31 A device under subclass 150.3 utilized as a digital differential analyzer, e.g., to solve differential equations.

SEARCH THIS CLASS, SUBCLASS:
182, for electrical differential analyzers of the analogue type.

150.4 A device under subclass 150 utilizing an analogue signal as a computing component and in which the computing component is employed more than once to determine a mathematical solution by successive steps.

(1) Note. For example, the computer may, by a process of successive approximations obtain the numerical solution of algebraic or transcendental equations or of differential equations.

SEARCH THIS CLASS, SUBCLASS:
150.1, for computers wherein a plurality of parameters are operated upon to produce an optimized output, which output is a function of the parameters.

150.5 A device under subclass 150 which is responsive simultaneously to at least one analog and one digital signal to perform at least one mathematical operation.

SEARCH THIS CLASS, SUBCLASS:
152+, for digital electrical computers.
184+, for analog electrical computers.

150.51 A device under subclass 150.5 wherein the mathematical operation performed is differentiation or integration.

SEARCH THIS CLASS, SUBCLASS:
183, for computers provided with two data inputs and having means to perform the operation of differentiation or integration.

SEARCH CLASS:
328, Miscellaneous Electron Space Discharge Device Systems, subclass 127+ for electron tube systems designed to perform the operation of differentiation or integration.
333, Wave Transmission Lines and Networks, subclass 19 for electric wave differentiating or integrating networks of the passive type.

150.52 A device under subclass 150.5 wherein one of the mathematical operations performed is multiplication.

SEARCH THIS CLASS, SUBCLASS:
156+, for arithmetical computers of the digital type that may perform the mathematical operation of multiplication.
194+, for arithmetical computers in general that perform the operation of multiplication.

SEARCH CLASS:
324, Electricity, Measuring and Testing, subclass 142 for watt meters.
328, Miscellaneous Electron Space Discharge Device Systems, for electron tube systems where the output is the product of plural inputs.

150.53 A device under subclass 150.5 which, by a mathematical operation or as a part of a mathematical operation, generates a signal representing a non-linear function of at least one variable input parameter, the information controlling the desired degree of non-linearity being inserted into or inherently stored in said device for the purpose of ~~[illegible]~~ controlling the generation.

(1) Note. Where the device does not carry out a mathematical operation but is useable as a part of a mathematical operation, this subclass is residual, i.e., classification is here if these devices are not elsewhere classifiable.

(2) Note. Where there are a plurality of variable input parameters, only if the partial derivative of the generated function with respect to one of the variable inputs is not constant, is the generated function non-linear with respect to that variable input. Thus the function must be non-linear with respect to one variable input while all other inputs are held constant.

SEARCH THIS CLASS, SUBCLASS:
197+, for arithmetical computers in general for producing an output signal which is a mathematical function of an input signal.

SEARCH CLASS:
328, Miscellaneous Electron Space Discharge Device Systems, subclass 142+ for electron tube systems in general wherein the output signal is a non-linear function of the input.

151. Subject matter under subclass 150 connected to an external device to control it or be controlled thereby, the device being insufficiently included to afford a basis of classification in the class providing for the device.

SEARCH THIS CLASS, SUBCLASS:
58, for recording calculators.
61.6+, for record controlled calculators.
150.2+, for similar subject matter, but wherein the external device is a vehicle.

SEARCH CLASS:
340, Communications, Electrical, subclass 178+ for continuously variable indicating devices with calculation.

151.1 Subject matter under subclass 151 wherein the external device is used in a manufacturing process.

151.11 Subject matter under subclass 151.1 wherein the external device is a machine tool used in the manufacturing process.

151.12 Subject matter under subclass 151.1 wherein the manufacturing process includes a chemical or distillation step.

151.13 Subject matter under subclass 151.1 wherein the process is quality controlled, as by sample analysis.

151.2 Subject matter under subclass 151 wherein the distribution is controlled or an indication of distribution is furnished.

(1) Note. Distribution generally means the division of a plurality of units among a plurality of locations or channels. Examples are allocation of railroad cars among tracks, separation of letters by destination and electric power distribution. Class 271, Sheet Feeding or Delivering, provides for record sorting and collecting. See also subclass 61.6+ of this Class 235.

SEARCH THIS CLASS, SUBCLASS:
150.2+, for vehicle control or vehicle position indication.

SEARCH CLASS:
209, Classifying, Separating and Assorting Solids, subclass 72+ for automatic sorting systems.
221, Article Dispensing, subclass 7 for article dispenser operated registers, and subclass 9+ for article dispensers generally with automatic control.
222, Dispensing, subclass 23+ for dispensers generally with registers.

151.21 Subject matter under subclass 151.2 wherein the distribution of electric power is controlled or indicated.

151.22 Subject matter under subclass 151.2 wherein type composing or printing is controlled or indicated.

SEARCH CLASS:
234, Selective Cutting (e.g., Punching), subclass 4+ for type-width and interword-space totalizers or indicators.
276, Type Setting, subclass 13 for pattern control setting machines.

151.3 Subject matter under subclass 151 for measuring or testing the external device and/or including or utilizing the external device.

SEARCH CLASS:
23, Chemistry, subclasses 230+ and 253+ for chemical analytical and analytical control methods and apparatus respectively.
33, Geometrical Instruments, for geometrical instruments.
73, Measuring and Testing, for measuring and testing generally.
324, Electricity, Measuring and Testing, for electrical measuring and testing.

151.31 Subject matter under subclass 151.3 wherein electrical properties or quantities are measured or tested.

SEARCH CLASS:
324, Electricity, Measuring and Testing, subclass 34+ for magnetic measuring and testing; subclass 57+ for impedance, admittance, and related quantities measuring; and subclass 76+ for measuring and testing electricity per se.

151.32 Subject matter under subclass 151.3 wherein distance or rate of change of distance is measured or tested.

(1) Note. Distance includes length and thickness.

SEARCH CLASS:
33, Geometrical Instruments, subclass 125+ for distance measuring generally.
73, Measuring and Testing, subclass 488+ for speed or acceleration measuring.
324, Electricity, Measuring and Testing, subclass 68+ for measuring speed electrically.

151.33 Subject matter under subclass 151.3 wherein weight is measured or tested.

SEARCH CLASS:
73, Measuring and Testing, subclass 382+ for gravitational determination.
177, Weighing Scales, especially subclass 25+ for weighing scales with computers.

151.34 Subject matter under subclass 151.3 wherein the fluid flow of either gases or liquids is measured or tested.

SEARCH CLASS:
73, Measuring and Testing, subclass 194+ for volume or rate of flow meters.
137, Fluid Handling, subclass 551+ for fluid handling systems with registers.

151.35 Subject matter under subclass 151.3 wherein the measuring or testing involves material composition analysis, which may be either physical or chemical.

SEARCH CLASS:
23, Chemistry, subclasses 230+ and 253+ for chemical analytical and analytical control methods and apparatus, respectively.
55, Gas Separation, subclass 270 for gas separating devices with metering.
73, Measuring and Testing, subclass 23+ for gas analysis.

152. Device under subclass 150 employing signals which represent numerical digits.

(1) Note. This subclass includes devices which respond to signals for which a discretely varying characteristic may be frequency, pulse rate, number of pulses, their grouping or time position within the pulse group.

(2) Note. The subject matter of this subclass includes systems which employ operator or control symbols (signs +, -, arithmetical orders x, ÷, etc.) which are expressed by the same characteristic as the digits of the number set forth in the above definition. Numbers may be expressed in any base or radix (2,10), or combination thereof (binary, coded decimal, British monetary system).

153. Subject matter under subclass 152 which test for malfunction in operation or error in the results produced.

154. Subject matter under subclass 152 including a signal converter to change input signals to conform to the system employed by the calculator, or to change result signals of the calculator to conform to the system of a data output device.

SEARCH CLASS:
340, Communications, Electrical, subclass 347 for mere digital to, or from analog conversion.

155. Device under subclass 154 for receiving coded signals representing numbers in a first radix (base) and producing an output indication or signal in a second radix.

156. Subject matter under subclass 152 which performs the more complex arithmetical operations such as multiplication, division, square root, or sequences thereof.

SEARCH THIS CLASS, SUBCLASS:
193.5, for arithmetical root extracting devices of non-digital type.

157. Device under subclass 156 which includes a cycling and/or programming structure for altering the normal operation of the machine.

(1) Note. This subclass includes devices for skip instruction, machine timing cycle modification, computing new instruction or altering instruction using initial computed result.

SEARCH THIS CLASS, SUBCLASS:
61.6+, for devices which are initially controlled by record means.

158. Subject matter under subclass 156 for performing square root operation.

SEARCH THIS CLASS, SUBCLASS:
193.5, for square root extracting devices of the non-digital type.

159. Device under subclass 156 wherein the radix is ten, expressed in terms of another lesser radix.

(1) Note. The radix may be binary or bi-quinary (2,5) yet receiving pulse trains in decimal form; or may be binary, receiving pulse groups, the individual pulses of which have weighted significance, e.g., 1, 2, 2, 4 or 1, 2, 4, 8.

160. Device under subclass 156 wherein the radix is ten.

161. Subject matter under subclass 160 composed of electromagnetic relays for multiplication.

162. Subject matter under subclass 161 including structure capable of alternative division.

163. Subject matter under subclass 160 composed of electromagnetic relays for division.

164. Subject matter under subclass 156 wherein the radix is two.

165. Subject matter under subclass 164 wherein data is dynamically stored, recirculated (by magnetic drum, acoustic relay line, etc.) and is repetitively presented for use in calculation.

166. Subject matter under subclass 165 which includes a cathode ray tube.

SEARCH THIS CLASS, SUBCLASS:
171, for a cathode ray tube which performs addition and/or subtraction.

167. Subject matter under subclass 165 which includes a magnetic record as part of the calculator.

SEARCH THIS CLASS, SUBCLASS:
58, for a device having a record of the calculator external to the calculating element.
61.6+, for a device with record controlled input.

168. Subject matter under subclass 152 which includes a device for performing addition and/or subtraction.

(1) Note. The subject matter of this subclass includes plural counters or accumulators wherein mechanism is provided for selection of a particular register for entry.

SEARCH THIS CLASS, SUBCLASS:
156+, for the selection of a register for the purpose of multiplication, division, etc.

169. Device under subclass 168 which corrects for a change in radix, e.g., binary coded decimal with "6" correction; or a change in code within the radix, e.g., reflected binary to conventional binary.

SEARCH THIS CLASS, SUBCLASS:
174, for a device operating in coded decimal fashion which does not require radix correction.

170. Subject matter under subclass 169 wherein the devices operate in serial fashion.

(1) Note. The subject matter of this subclass includes devices to which plural pulse trains are presented for arithmetic combination, the order of the pulses in a train having particular mathematical significance, as 1, 2, 4, 8, and wherein pulses of corresponding mathematical significance are received simultaneously for arithmetic combination.

171. Device under subclass 168 employing a cathode ray tube wherein the beam is modified (deflected, interrupted, etc.) to produce a result signal of sum and/or carry significance.

172. Device under subclass 168 which receives pulses in coincidence to produce voltage or current impulses of abnormal amplitude which indicate sum and/or carry.

173. Device under subclass 168 wherein a plurality of elements are interconnected to perform at least one kind of parallel arithmetical operation.

(1) Note. Numerical results may be presented in the form of signals stored in parallel elements, as in an accumulator or in the form of signals appearing at parallel outputs without storage, as in a parallel binary adder.

SEARCH THIS CLASS, SUBCLASS:
92, for counting structure which includes order to order carry, and for add-subtract counters which do not complement.

174. Subject matter under subclass 173 wherein the radix is ten, expressed in terms of another lesser radix.

SEARCH THIS CLASS, SUBCLASS:
169, for a device which accomplishes radix correction.

175. Device under subclass 173 wherein the radix is two.

176. Device under subclass 168 wherein signal trains representing the digits to be added or subtracted are presented as inputs in serial fashion.

SEARCH THIS CLASS, SUBCLASS:
170, for serial adders with radix correction entry features.

177. Device under subclass 168 wherein plural trains of signals are compared to produce an output signal representative of identity or dissimilarity as to mathematical magnitude or length of a pulse train of the input signals.

SEARCH CLASS:
307, Electrical Transmission or Interconnection Systems, subclass 88 for a passive element gating device.
328, Miscellaneous Electron Space Discharge Device Systems, subclass 91+ for electron tube gating means.

178. Subject matter under subclass 150 comprising a magnetic amplifier.

SEARCH CLASS:
323, Electricity, Voltage Magnitude and Phase Control Systems, subclass 89 for a saturable reactor of general utility.
330, Amplifiers, subclass 8 for amplifiers having a saturable reactor type amplifying device (magnetic amplifier).

179. Subject matter under subclass 150 including a bridge circuit which performs at least part of the calculating operation.

SEARCH CLASS:
323, Electricity, Voltage Magnitude and Phase Control Systems, subclass 75 for a bridge circuit of general utility.
324, Electricity, Measuring and Testing, subclass 57 for a bridge used in testing.

180. Subject matter under subclass 150 for solving polynomial, or simultaneous, equations.

(1) Note. Includes a device wherein the parameters of an electrical circuit, matrix or network are adjusted to produce a resultant signal, certain of the values of the parameters or signals representing the desired unknowns.

181. Subject matter under subclass 150 for solving for $\lim_{T\to\infty} \int_{-T}^{T} f_1(t)\ f_2(t+\tau)\ dt$ (cross correlation), or $\lim_{T\to\infty} \frac{1}{2T} \int_{-T}^{T} f_1(t)\ f_2\ (t+\tau)\ dt$ (auto-correlation); where $f_1(t)$ is one function, $f_2(t)$ is a second function, t is time and τ is a delay quantity.

182. Subject matter under subclass 150 for solving differential equations.

SEARCH THIS CLASS, SUBCLASS:
150.31, for digital differential analyzers.

183. Subject matter under subclass 150 provided with two data inputs and means to perform differentiation and/or integration.

SEARCH CLASS:
318, Electricity, Motive Power Systems, subclasses 18 and 28 for a motor control network involving differentiation and/or integration.
328, Miscellaneous Electron Space Discharge Device Systems, subclass 127 for an electron space discharge system with one input which performs an integrating or differentiating function upon a signal of general utility.
333, Wave Transmission Lines and Networks, subclass 19 for a passive network performing differentiation or integration of general utility.

184. Subject matter under subclass 150 which is constructed as a representation of some physical system, or mathematical relationship.

SEARCH CLASS:
35, Education, subclass 12 for a training device including simulation of aircraft movement or control.

185. Subject matter under subclass 184 relating to a network for analyzing a system, known and unknown data being related in matric manner.

186. Device under subclass 150 involving a trigonometric function.

SEARCH CLASS:
318, Electricity, Motive Power Systems, subclass 28 for a device involving a trigonometric function for motor control.

189. Subject matter under subclass 186 relating to a plurality of vectors, one of which is a resultant.

190. Subject matter under subclass 186 which solves for an unknown parameter of a plane triangle.

191. Subject matter under subclass 190 relating to a right triangle.

192. Subject matter under subclass 191 which solves for the hypotenuse of the right triangle.

193. Subject matter under subclass 150 which performs an arithmetic operation.

193.5. Subject matter under subclass 193 wherein the device determines exponential roots (that is the output of the device is some numerical root of the input, such as the square root, cube root, etc.).

SEARCH THIS CLASS, SUBCLASS:
156+, for digital type root extracting systems, especially indented subclass 158 for square root computing systems.

SEARCH CLASS:
307, Electrical Transmission or Interconnection Systems, subclass 88 for nonlinear reactor systems in general and subclass 88.5 for transistor and nonlinear conductor systems in general.

323, Electricity, Voltage Magnitude and Phase Control Systems, particularly subclass 22 for voltage regulators of the discharge tube type which are controlled responsive to an electrical condition and subclass 66 for variable impedance regulators automatically responsive to voltage or current (e.g., amplitude compressors).

328, Miscellaneous Electron Space Discharge Device Systems, subclass 142+ for discharge tube systems wherein the output is a nonlinear function of the input, especially subclass 144+ for systems wherein the output is the square or square root of the input.

194. Subject matter under subclass 193 wherein the device performs multiplication.

195. Subject matter under subclass 194 which alternately performs division.

196. Subject matter under subclass 193 wherein the device performs division.

197. A device under subclass 150 which is responsive to or generates at least one analog signal and which, by a mathematical operation or as a part of a mathematical operation, generates a signal representing a non-linear function of at least one variable input parameter, the information controlling the desired degree of non-linearity being inserted into or inherently stored in said device for the purpose of controlling the generation.

(1) Note. This subclass includes a passive electrical network (resistance, inductance, etc.) which serves as a function generator.

(2) Note. Where the device does not carry out a mathematical operation but is useable as a part of a mathematical operation, this subclass is residual, i.e., classification is here if these devices are not elswhere classifiable. See for example Class 307, Electrical Transmission or Interconnection Systems, subclass 106+; Class 328, Miscellaneous Electron Space Discharge Device Systems, subclass 142+, and Class 338, Electrical Resistors, subclass 89+.

(3) Note. Where there are a plurality of variable input parameters, only if the partial derivative of the generated function with respect to one of the variable inputs is not constant, is the generated function non-linear with respect to that variable input. Thus, the function must be non-linear with respect to one variable input while all other inputs are held constant.

SEARCH THIS CLASS, SUBCLASS:
61.6+, for a device which generates a mathematical function by sensing a record, e.g., outline of a pattern followed by a light beam or the like.

198. Subject matter under subclass 197 wherein a pattern within the envelope of a cathode ray tube is sensed to produce a function signal.

SEARCH THIS CLASS, SUBCLASS:
61.6, for a device sensing a record or pattern which is external to the cathode ray tube.

200. Subject matter under subclass 61 utilizing fluid which represents information content; the system as a whole being specialized to a calculating function and having (1) fluid flow varying components which are connected by fluid storage or flow passages which, for example, act as a "feed back", a "carry" between components, distribute pulsed flow between components or act as information memory means or (2) one or more means utilizing a fluid, combined with a calculation value indicator.

SEARCH THIS CLASS, SUBCLASS:

150+, for electrical calculating systems in which an electrical signal and a fluid stream representing calculating information content form components of a system.

SEARCH CLASS:

137, Fluid Handling, subclass 803+ for devices of more general application in which fluid flow of one stream is effected by (1) fluid contact with another stream or by (2) use of an energy field and see the notes to Class 137, subclass 803 for the line between classes.

340, Communications, Electrical, subclass 172.5 for residual miscellaneous data processing systems, and subclass 347 for code converters, which are electrical at least in part.

201. Subject matter under subclass 200 including means indicating discrete pulses in a fluid stream, which pulses indicate digital information content.

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U. S. DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE

January 17, 1975
(Date)

THIS IS TO CERTIFY that the annexed is a true copy from the records of this office of Certain Requested Documents, in a Publication entitled:- Classification Definitions, identified therein.

By authority of the
COMMISSIONER OF PATENTS

W. B. Walden

Certifying Officer.

PK180

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UNITED STATES PATENT OFFICE

CLASSIFICATION DEFINITIONS

CLASS 340, COMMUNICATIONS, ELECTRICAL

Revision 1

REVISED BY THE OFFICE OF
EXAMINING AND CLASSIFYING CONTROL

JULY 1967

340, COMMUNICATIONS, ELECTRICAL

CLASS DEFINITIONS

This is the residual home for subject matter, not elsewhere classified, relating to communication systems which are in part or in whole electrical.

Communications is defined, for the purpose of this definition, as being the handling of information or intelligence and is not restricted to the conveyance of said information or intelligence between geographically spaced points. (Thus, a traffic obstruction light which merely marks a safety island is a means for communicating information or intelligence, viz., the fact of the presence of the traffic island.)

Information or intelligence is defined, for the purpose of this definition, as being the subject matter which is handled by signaling systems or signaling devices (such as telegraph systems) or by that portion of non-signaling systems or non-signaling devices (such as power supply systems) which is designated in the arts as having a control function (such as the supervisory circuits which control the circuit breakers of an electric power network).

Handling, as used above, is defined as being the active co-action between the tangible communication system or device and the intangible information or intelligence, and such co-action may assume various forms, such as transmission, storage, exhibiting, etc.

NOTES

(1) Note. Since Class 340 takes, under the class definition, only those electrical communication systems which are not elsewhere classified, the search, in order to be complete, must, in appropriate instances, extend to Classes 178, 179, 246, 250, 332, 343 and 346. See the references to these classes below under SEARCH CLASS.

(2) Note. The combination of the subject matter of this class (340) and art environment is generally classified with the art environment where that environment is significant, either by virtue of a significant disclosed relationship or by virtue of a claimed relationship. Where the art environment is recited by name only the combination may be classified, in some instances, with the art environment, and in others, in this class (340). For a list of some of the other classes which contain pertinent subject matter, see the classes referred to under SEARCH CLASS.

(3) Note. This classification was produced in 1952 by making official the unofficial digests which had been established by the Examiners of Division 42 during the period from about 1910 to about 1942. A caveat is given: While it is believed that the titles and definitions are reasonably correct, no assurance can be given that all of the patents, issued prior to the date of reclassification, are in the proper subclass, since the individual patents were not read during the reclassification project. Consequently, in making a thorough search in this class, it is advisable to investigate every subclass which may possibly be pertinent and not, in order to shorten the search, to rely upon the principle of superiority of subclass subject matter because of position in schedule, since the principle is applicable only in classes where each patent has been analyzed and placed in the schedule in accordance with that portion of the disclosed subject matter which is claimed.

SEARCH CLASS:

9, Boats, Buoys and Aquatic Devices, subclass 8+, particularly 8.3, for floating buoys utilized for marine navigation.

15, Brushing, Scrubbing and General Cleaning, subclass 339 for brushing, scrubbing and general cleaning machines having a signal or indicator to indicate the condition of the machine or work.

23, Chemistry, subclass 252+ for chemical apparatus having means to electrically signal the condition of said apparatus or the result of a chemical test.

34, Drying and Gas or Vapor Contact With Solids, subclass 89 for apparatus of that class combined with indicating or signaling means.

35, Education, subclass 9 for educational appliances which have a question and hidden answer, some of which signal a correct answer and subclass 35 for machines by which a blind person can read printed material, said machine furnishing signals which are a coded representation of the printed material.

40, Card, Picture and Sign Exhibiting, subclass 52+ for electrically actuated changeable exhibitors, such as the advertising display type and subclass 130+ for illuminated signs having significant sign structure in addition to electric illumination. Advertising display electric light systems are in this class (340) subclass 321+.

43, Fishing, Trapping and Vermin Destroying, subclasses 16, 17 and 58 for the subject matter of that class combined with signals and indicators.

46, Amusement Devices, Toys, subclass 45+ for electric and magnetic toys having electric signals and subclasses 227+ and 232 for toys which have electric sound producers.

58, Horology, subclass 23+ for electric systems which indicate time and for electric clocks.

70, Locks, subclass 434 for locks combined with electric recorders for indicating the previous condition of the lock, and other appropriate subclasses for locks combined with electric signals.

73, Measuring and Testing, appropriate subclasses for testing devices which make a test of the Class 73 type (usually non-electrical and non-chemical) and signal the result of said test by electrical means. Note particularly subclasses 26+, 301, 304, 308, 313, 359+, 362 and 398+.

81, Tools, subclass 52.5 for torque wrenches having electrical means to indicate the torque exerted.

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84, Music, subclass 405 for xylophones with electric action, subclass 407 for bell sets (carillons) with electric action and subclass 462 for electric devices responsive to playing of a musical instrument for recording the action of said instrument.

99, Foods and Beverages, subclass 285 for beverage infusers having signal means and subclass 342+ for cookers having signal means.

100, Presses, subclass 99, for presses having electrical means to indicate the condition of the press or the material being pressed.

109, Safes, Bank Protection and Related Devices, subclass 38+ for safes and analogous structures having alarm devices for signaling loss of integrity.

114, Ships, subclass 237 for indicators for locating the position of a towed vessel with respect to the towing vessel.

116, Signals and Indicators, see paragraphs V and VI of the class definition for the line between the electrical signals in Class 340 and the mechanical signals in Class 116. Search appropriate subclasses of Class 116 for mechanical signals and indicators analogous to the electrical signals and indicators of Class 340. Search subclass 20 for heliographic signaling along a light ray.

118, Coating Apparatus, subclass 10 for coating apparatus having a signal or indicator.

119, Animal Husbandry, subclass 14. 14+ for milkers having a signal or indicator.

128, Surgery, subclass 2.1 for electric diagnostic devices having signals or indicators.

134, Cleaning and Liquid Contact With Solids, subclass 113 for cleaning or wetting devices having signals or indicators.

136, Batteries, subclass 182 for electric batteries having indicating means or for the indicator per se.

137, Fluid Handling, subclass 551+ for fluid handling equipment having signal or indicating means.

160, Closures, Partitions and Panels, Flexible and Portable, subclass 10 for the subject matter of that class having signals or indicators.

169, Fire-Extinguishers, subclass 19+ for fire extinguishing systems having automatically opened valves and subclass 23 for fire extinguishing systems having alarms which indicate some abnormal condition of the fire extinguishing system. The nominal combination of a fire extinguishing system, recited non-significantly, as by name only, and a significantly recited electric signaling system is classified in appropriate subclasses of Class 340, especially subclasses 289 and 320.

174, Electricity, Conductors and Insulators, subclass 11 for fluid-insulated conductors having means to indicate the condition of the fluid.

177, Weighing Scales, subclass 45+ for a weigher having an alarm or signal.

178, Telegraphy, appropriate subclasses for telegraphic signaling. See the class definition of Class 178 for the line between Classes 178 and 340. The combination of a Class 340 system and a Class 178 system is classified in Class 340 in appropriate subclasses, such as subclasses 216, 220, 288 and 310.

179, Telephony, appropriate subclasses for telephonic signaling and for the combination of a Class 340 signaling system and a Class 179 telephone system. In the combination the signaling system may or may not be ancillary to the telephone system. Note particularly subclass 2+.

181, Acoustics, subclass .5 for miscellaneous compressional wave devices and systems, such as those used in seismic prospecting. Also see subclasses 1+, 4+ and 15+ of Class 340 for similar subject matter.

182, Fire Escapes, Ladders, Scaffolds, subclass 18 for a fire escape, ladder or scaffold having an indicator, signal or alarm.

185, Motors, Spring, Weight and Animal Powered, subclasses 14, 36 and 44 for spring and weight motors having indicators to show the extent they are wound up or run down.

187, Elevators, appropriate subclasses for significantly claimed elevator mechanisms combined with signaling means.

188, Brakes, appropriate subclasses for significantly claimed brakes or brake systems combined with signals.

194, Check-Controlled Apparatus, subclasses 8 and 16 for coin controlled mechanisms having a signal to indicate the condition (e.g., counterfeit coin) of the mechanism.

197, Typewriting Machines, appropriate subclasses for typewriters having signals to indicate the condition or operation of the machine. Note particularly subclass 12+.

198, Conveyers, Power-Driven, subclass 40 for conveyers having signaling means.

200, Electricity, Circuit Makers and Breakers, subclass 167 for switches having indicators to indicate the position or condition of the switch.

215, Bottles and Jars, subclass 7+ for bottles or jars having indicating means.

221, Article Dispensing, subclass 2+ for article dispensers not otherwise classified having indicators or signals.

222, Dispensing, subclass 23+ for fluent material dispensing means having indicators or signals.

232, Deposit and Collection Receptacles, subclasses 34 to 37 for letter boxes having signals or indicators.

234, Selective Cutting (e.g., Punching), subclass 4+, for a typographical punching machine provided with means to indicate approach to and entry into the justification zone; subclasses 13+ and 22+, for a selective cutting machine with automatic control usually initiated by an indicator or detector of a given operating condition; subclass 59+, for a pattern-controlled selective cutting machine which may be electrically operated.

235, Registers, appropriate subclasses, for registers, calculators or counters having signaling or indicating means.

240, Illumination, appropriate subclasses, for illuminating means which may serve as signaling means. Note especially subclasses 1.2, 7.1+, 10.5+, 11.2+, 15, 22+, 25, 26 and 41+.

241, Solid Material Comminution or Disintegration, subclass 101 for the subject matter of that class having signals and indicators.

242, Winding and Reeling, subclasses 36+, 49, 57, 71.2, 148, 183+ and 186+, for winding and reeling apparatus having signals and indicators.

243, Pneumatic Dispatch, subclass 36 for pneumatic dispatch devices having signals or indicators.

246, Railway Switches and Signals, for railway signaling and control systems. See the class definition of Class 246 for the line between Classes 246 and 340.

250, Radiant Energy, for signaling systems of the radiant energy type. Such signaling systems are co-extensively classified in Class 343, and the class definitions of these two classes should be consulted for the line between Classes 250 and 343, and the class definition of Class 343 for the line between Classes 343 and 116. Note that Class 340 provides, in subclass 189+, for telemetering along a radiant energy beam and, in subclasses 34 and 228, for signaling systems having a radiant energy responsive detector. Also search Class 250, subclass 83+ for indicators which indicate the strength of invisible radiation.

258, Railway Mail Delivery, subclass 2 for the subject matter of that class (which includes delivery to and from airborne vehicles) having signaling features.

276, Type Setting, subclass 11 for type setting machines having means for indicating the length of the line set.

291, Track Sanders, subclass 17 for track and vehicle sanding machines provided with alarms to indicate the operation thereof.

307, Electrical Transmission or Interconnection Systems, appropriate subclasses for the subject matter of that class having signals and indicators. Note that many of the systems of this class, while not having signals and indicators, have automatic controls which are analogous to signals.

312, Supports, Cabinet Structures, subclass 234+ for cabinets having indicators.

313, Electric Lamp and Discharge Devices, subclass 10 for electric space discharge devices, such as vacuum tubes, or electric lamps having temperature indicators.

314, Electric Lamp and Discharge Devices, Consumable Electrodes, subclass 9 for electric arc lamps having a signal or indicator.

315, Electric Lamp and Discharge Devices, Systems, subclass 129+ for electric gas discharge device systems or electric lamp systems having signals, indicators or alarms and subclass 364+ for space discharge devices testing or lamp testing equipment having signals or indicators.

318, Electricity, Motive Power Systems, subclass 490 for electric motor systems having signals or indicators.

320, Electricity, Battery and Condenser Charging and Discharging, subclass 48 for battery charging and discharging systems having signals or indicators.

322, Electricity, Single Generator Systems, subclass 99 for electric generator systems having signals or indicators.

324, Electricity, Measuring and Testing, appropriate subclasses for testing systems for making tests of electric properties having means to indicate the result of the test. Note subclass 1+ for testing systems for locating ore bodies having means to indicate the result of the test, and subclass 76+ for meters for measuring a property of an electric current or voltage or combination thereof (e.g., power factor, watt-hours, phase angle frequency). Telemetering systems which utilize a meter as a portion thereof are in Class 340, subclass 177+, but the meter subcombination per se is classified with the meters of Class 324. Telemetering systems which, by significantly claimed structure or circuit, indicate the result of an electrical test at a point remote from the point of measurement are classified with the test in Class 324, as such telemetering systems are not of general utility, but are restricted to use in Class 324 measurements.

329, Demodulators and Detectors, for demodulators and detectors of modulated intelligence including continuous waves (CW), and which furnish something more than the mere indication of the initiation of the signal.

331, Oscillators, appropriate subclasses, for electric oscillation generators of utility in the communication systems of Class 340. Subclass 64 of Class 331 for oscillator systems provided with an indicator, signal or alarm.

332, Modulators, subclasses 20 and 39 for modulators having signals and indicators.

333, Wave Transmission Lines and Networks, for wave transmission systems wherein electromagnetic wave energy is guided or constrained by a propagation medium of appreciable electrical length as compared to the wave length of the propagated energy. This class includes numerous networks and components useful in communications. Note particularly subclass 20 for wave shaping networks of the passive type, subclass 24+ for coupling networks including delay networks and filters, and subclass 34+ for long lines having distributed electrical parameters, and subclass 1+ for plural channel systems of these lines and networks.

Sub. 1.

336, Inductor Devices, subclass 45 for inductors having movable parts and means to indicate the position of the movable part.

338, Electrical Resistors, subclasses 13+ and 68+ for variable resistors including rheostats and potentiometers.

343, Communications, Radio Wave, appropriate subclasses for signaling systems of the radio wave energy type. See the reference to Class 250, supra, for the lines between Classes 250, 340 and 343. See subclass 760 for antennas with a signal, indicator, or alarm which is responsive to the scan, sweep or orientation of the antenna; and subclass 894 for antennas with a signal, indicator, or alarm responsive to some other condition of the antenna. See (4) Note, C, 3, under subclass 700 of this Class (343) for certain classification lines involving antennas and signals, indicators, and alarms.

346, Recorders, appropriate subclasses for signals or indicators which record, and subclasses 16 and 17+ for recorders combined with signals and indicators.

356, Optics, Measuring and Testing, for visible light type testing and examination instruments particularly for light radar devices in subclass 3+, subclass 43+ for optical pyrometers, subclass 156+ for mensuration and configuration comparison devices, subclass 173+ for shade or color tests devices, subclass 213+ for photometers and subclass 237+ for flaw and imperfection devices.

SUBCLASSES

1. Subject matter under the class definition having means for sending out an impulse or a continuous signal and receiving said signal after a reflection, said reflection being utilized to add some information to the original signal.

(1) Note. In scope this subclass is coextensive with Class 343, Communications, Radiant Energy, subclass 5, and the search notes of that class should be consulted.

(2) Note. The patents in this subclass relate principally to sound echo compressional wave systems.

SEARCH CLASS:
343, Communications, Radio Wave, subclass 5 (see search note 1 above).

2. Subject matter under subclass 1 wherein means are provided for imparting more energy to the reflected signal than is received, at the reflecting means, in the incident signal.

(1) Note. The patents in this subclass relate principally to transponders of the floating buoy type, such as are used in marine surveying, or to systems wherein a floating buoy picks up the sound of passing vessels and relays such sounds to a shore station.

3. Subject matter under subclass 1 in which the reflection takes place under water.

(1) Note. This subclass relates principally to SONAR systems.

SEARCH THIS CLASS, SUBCLASS:
2, for this subject matter having means to cause the reflected energy to be greater than the incident energy.

4. Subject matter under the class definition in which a significant portion of the communication takes place under water.

SEARCH THIS CLASS, SUBCLASS:
320, for signaling systems in which the signal is transmitted along a fluid conduit but not through the fluid therein.

SEARCH CLASS:
116, Signals and Indicators, subclass 27 for this subject matter, when non-electrical.

5. Subject matter under subclass 4 in which the signal is carried under water by means of compressional waves.

SEARCH CLASS:
116, Signals and Indicators, subclass 27 for similar subject matter in the non-electrical art.
181, Acoustics, for similar subject matter in the acoustic art.

6. Subject matter under subclass 5 for determining the distance and/or direction of one object with respect to another.

7. Subject matter under subclass 5 utilized in geophysical exploration.

8. Subject matter under subclass 5 relating to underwater vibration transducers for transforming compressional wave energy in the water into electrical signals or vice versa.

SEARCH CLASS:
73, Measuring and Testing, subclass 70+ for vibration sensing apparatus utilized in the physical testing of materials.
116, Signals and Indicators, subclass 27 for mechanical submarine bells.
179, Telephony, subclass 101+, for electro-acoustic transducers used in telephony.
181, Acoustics, subclass .5 for miscellaneous acoustical systems, such as supersonic systems, which have electro-acoustic transducers.
259, Agitating, subclass 1, for this subject matter when utilized for agitating.
310, Electrical Generator or Motor Structure subclass 2+, especially indented subclass 8+, and subclass 26 for reversible motor and generator structures of general utility, similar to the transducers in these subclasses.

116, Signals and Indicators, subclass 27 for mechanical submarine bells.
179, Telephony, subclass 101+, for electro-acoustic transducers used in telephony.
181, Acoustics, subclass .5 for miscellaneous acoustical systems, such as supersonic systems, which have electro-acoustic transducers.
259, Agitating, subclass 1, for this subject matter when utilized for agitating.
310, Electrical Generator or Motor Structure subclass 2+, especially indented subclass 8+, and subclass 26 for reversible motor and generator structures of general utility, similar to the transducers in these subclasses.

9. Subject matter under subclass 8 having a plurality of transducers arranged in a spatial relationship.

(1) Note. Attention is directed to the fact that the law of radiation from an extended source in the field of radio antennas is also applicable to the field of underwater vibration transducers and that a search in the class of antennas may therefore be appropriate.

(2) Note: In the underwater art the subject matter of this subclass is often referred to as piston type.

SEARCH CLASS:
343, Communications, Radio Wave, subclass 700+ for radio wave antennas. See also (1) Note above.

10. Subject matter under subclass 8 comprising a piezoelectric crystal.

SEARCH CLASS:
29, Metal Working, subclass 25.35 for processes of making the devices in this subclass.
310, Electrical Generator or Motor Structure, subclass 8+ for piezoelectric devices of general utility.

11. Subject matter under subclass 8 comprising a magnetostrictive element.

SEARCH CLASS:
310, Electrical Generator or Motor Structure, subclass 26 for magnetostrictive electro-acoustic transducers of general utility.

12. Transmitters under subclass 8.

(1) Note. This subclass includes, for example, transmitters which produce the compressional wave in the water by means of an electric spark, and it also includes reversible transmitters which can act as receivers, provided that they are not of the type which belong in subclasses 9 to 11.

13. Receivers under subclass 8.

(1) Note. This subclass contains only irreversible receivers, such as carbon microphones.

14. Subject matter under subclass 8 having a diaphragm.

15. Subject matter under the class definition in which the intelligence is conveyed by compressional waves.

SEARCH THIS CLASS, SUBCLASS:
1+, for this subject matter utilized in echo systems, and subclass 5+ for this subject matter utilized in underwater systems.

SEARCH CLASS:
73, Measuring and Testing, subclass 67+, especially 69, for similar subject matter for testing objects or materials.
181, Acoustics, subclass .5 for similar subject matter.
330, Amplifiers, particularly subclass 130 for amplifiers having voltage bias controls of the type used in seismic exploration systems.

15.5. Subject matter under subclass 15 relating to systems for transmitting and/or receiving compressional waves, which pass through the earth.

SEARCH CLASS:
324, Electricity, Measuring and Testing, subclass 1+, for geophysical surface or subsurface exploration in situ generally.

16. Subject matter under subclass 15 for determining the distance and/or direction or presence of one object with respect to another.

SEARCH THIS CLASS, SUBCLASS:
1+, for sound echo compressional wave systems.

SEARCH CLASS:
343, Communications, Radio Wave, subclass 5+, for object detection systems using radio waves, i.e., radar.

17. Subject matter under subclass 15 for transducing geophysical vibrations into electric currents or vice versa.

SEARCH THIS CLASS, SUBCLASS:
8+, for underwater compressional wave transducers.

SEARCH CLASS:
73, Measuring and Testing, subclass 70+, for vibration sensing transducers; and subclass 488+, for accelerometers.
179, Telephony, subclasses 101+ and 121+, for telephone loudspeakers and microphones, as where the intelligence is speech.
310, Electrical Generator or Motor Structure, subclass 8+, for piezoelectric transducers not otherwise classifiable; and subclass 26, for magnetostrictive transducers not otherwise classifiable.

18. Subject matter under the class definition having a well bore environment.

(1) Note. This subclass includes, for example, telemetering up and down a well bore so that the conditions at the bottom of the bore may be determined at the surface.

SEARCH CLASS:
73, Measuring and Testing, subclass 151+ for bore hole and drilling study equipment in general.

166, Wells, subclass 250+ for well processes including signaling means, and subclass 66 for well apparatus including electrical signaling means.

19. Subject matter under the class definition in an elevator environment.

SEARCH CLASS:
116, Signals and Indicators, subclass 64 for similar subject matter of a non-electrical nature.

20. Subject matter under subclass 19 for dispatching purposes.

21. Subject matter under subclass 19 for indicating the position of the elevator in its shaft.

22. Subject matter under the class definition in a vehicle or traffic environment or utilized to signal to traffic or vehicles.

SEARCH CLASS:
40, Card, Picture and Sign Exhibiting, subclass 28+ for changeable exhibitors utilized in advertising and adapted for use in other signaling applications.

116, Signals and Indicators, subclass 28+ for this subject matter when non-electrical.
240, Illumination, subclass 7.1+, for vehicle lighting. Note particularly subclasses 7.15, 7.5, 8.24, 8.25, 8.3, 8.4 and 8.41.

23. Subject matter under subclass 22 for describing the position or the sequence of vehicles.

(1) Note. This subclass includes, for example, systems in which an observer can report the type of the next train to arrive at a terminal, or for designating the location of airplanes in an airplane stack at a landing field.

24. Subject matter under subclass 23 having means for plotting the position of the vehicle.

25. Subject matter under subclass 22 in which the vehicle is an aircraft vehicle.

SEARCH CLASS:
40, Card, Picture and Sign Exhibiting, subclass 217 for ground indicia to be read by aircraft passing thereover.
240, Illumination, subclass 1.2, for aviation lights.

26. Subject matter under subclass 25 for controlling the traffic at an airport.

(1) Note. This subclass includes, for example, signals at the airport which are visible to the aircraft.

27. Subject matter under subclass 25 for indicating the condition of the aircraft.

(1) Note. The subject matter of this subclass is generally automatically responsive to the condition of the aircraft, but not necessarily so. It includes, for example, indicators which warn the pilot when a stall is about to take place.

SEARCH CLASS:
73, Measuring and Testing, subclass 178+ for instruments used in navigation of aircraft, such as rate of climb indicators.

Subject matter under subclass 25 comprising obstruction lights.

SEARCH CLASS:
240, Illumination, subclass 1.2, for aviation lights.

29. Subject matter under subclass 22 in which the vehicle is a nautical vehicle.

(1) Note. The subject matter of this subclass may be automatically responsive to a condition but not necessarily so. This subclass includes, for example, shoal water alarms and iceberg presence alarms.

SEARCH CLASS:
114, Ships, subclass 237 for indicators which indicate the position of a towed vessel with respect to a towing vessel.
116, Signals and Indicators, subclass 26+ for similar subject matter of non-electrical nature.

30. Subject matter under subclass 29 for indicating the position of the vessel's rudder.

31. Subject matter under subclass 22 in which the signals are automatically actuated by traffic.

(1) Note. Traffic may be produced by the passage of either vehicle or pedestrians or otherwise. The traffic which controls the signals may, in turn, be controlled by the signal indications.

SEARCH CLASS:
246, Railway Switches and Signals, appropriate subclasses, for railway signaling and control systems automatically controlled by traffic.

32. Subject matter under subclass 31 in which the signal or its controller are in the vehicle.

(1) Note. The dashboard may, for example, carry a signal which glows red when the vehicle should stop, or the vehicle may carry a button on its dashboard which, when depressed, will cause a red light, which bars the vehicle's passage, to change to green.

33. Subject matter under subclass 32 in which the signal is actuated by another vehicle.

(1) Note. The other vehicle may, for example, be an emergency vehicle, which has the right of way over the vehicle containing the signal.

34. Subject matter under subclass 33 in which the intelligence is transmitted from one vehicle to another by means of a radiant energy or acoustic link.

(1) Note. One vehicle may, for example, emit a supersonic sound which actuates a stop light on the dashboard of the other vehicle.

35. Subject matter under subclass 31 having a plurality of intersections.

(1) Note. Each intersection may, for example, have an individual traffic light and these plurality of signal lights may be synchronized or not.

36. Subject matter under subclass 31 in which an intersection between a major artery and a minor artery has a signal for controlling the traffic and the traffic on the major artery is preferred by the signal, in some manner over the traffic on the minor artery.

(1) Note. For example, the preference may be due to the fact that the green light normally favors the major artery.

37. Subject matter under subclass 31 having means to control the traffic in accordance with a time schedule which is additional to the control by the traffic.

38. Subject matter under subclass 31 relating to traffic detectors for detecting the presence or motion of the traffic.

(1) Note. The traffic may, for example, be detected by photoelectric means or treadle switches.

SEARCH CLASS:
200, Electricity, Circuit Makers and Breakers, subclass 86 for tread operated switches.
250, Radiant Energy, subclass 200+ especially subclass 221+ for photoelectric devices and systems useful in this subclass.

39. Subject matter under subclass 38 which distinguishes the passage of a vehicle in one direction from its passage in the opposite direction.

40. Subject matter under subclass 22 having multiple intersections.

(1) Note. Each intersection, for example, may be provided with an individual traffic light.

SEARCH THIS CLASS, SUBCLASS:
35, for this subject matter, controlled in part by traffic.

41. Subject matter under subclass 22 having means to drive the signaling systems through a timed cycle of operation or having means for performing some timing operation.

SEARCH THIS CLASS, SUBCLASS:
37, for this subject matter combined with traffic-actuated traffic control.

42. Subject matter under subclass 41 combined with or having other features or plural systems of the subclass 41 type.

(1) Note. The system may be, for example, combined with a one way sign.

43. Subject matter under subclass 41 having means to indicate the time which will elapse before the signal will change to its next indication.

44. Subject matter under subclass 41, having means to indicate to pedestrians, commands or information.

(1) Note. The system may, for example, indicate when it is permissable for the pedestrian to cross the intersection.

45. Subject matter under subclass 41 having a barrier, which, at times, prevents passage of traffic.

SEARCH CLASS:
49, Movable or Removable Closures, appropriate subclasses, for closures and closure-actuating mechanism of the type provided for.
246, Railway Switches and Signals, subclass 125+, 261 and 272 for railway crossing gate systems.

46. Subject matter under subclass 22 having means to guard against signal failure.

(1) Note. The system may, for example, have means to switch an auxiliary signal into operation if the main signal may fail.

47. Subject matter under subclass 22 intended for use in connection with railways.

SEARCH THIS CLASS, SUBCLASS:
45, for cycling gate systems used to control traffic.

SEARCH CLASS:
246, Railway Switches and Signals, appropriate subclasses for this subject matter when any significant railway or train structure is claimed.

48. Subject matter under subclass 47 for signaling along the length of a train.

SEARCH THIS CLASS, SUBCLASS:
177+, for telemetering of general application.
213+, for signaling automatically in response to a condition.
286+, for signaling of general application.

49. Subject matter under subclass 47 having means for signaling with a moving indicator which continuously moves in wigwag fashion.

SEARCH THIS CLASS, SUBCLASS:
374, for wigwag signals per se.

50. Subject matter under subclass 47 having means for projecting a beam of light.

SEARCH THIS CLASS, SUBCLASS:
366+, for light beam signals per se.

51. Subject matter under subclass 22 having means to indicate a parking condition.

(1) Note. This subclass includes, for example, parking lot systems.

SEARCH THIS CLASS, SUBCLASS:
43, for this subject matter combined with means to indicate the time lapsed till parking expires.

52. Subject matter under subclass 22 having means automatically responsive to the condition of the vehicle and means, responsive thereto, for indicating said condition.

53. Subject matter under subclass 52 having means for controlling the vehicle.

(1) Note. The system, for example, may include means to short-circuit the ignition or to actuate a register to indicate when violation of a speed regulation occurred.

54. Subject matter under subclass 52 having manual means to control the signaling system, in addition to the automatic means.

(1) Note. The system may, for example, contain means to manually set the signals and to automatically cancel them when a certain condition occurs.

55. Subject matter under subclass 54 in which the manual control is for a direction signal.

56. Subject matter under subclass 52 having means to automatically reset the signal after it has been automatically set.

SEARCH THIS CLASS, SUBCLASS:
54+, for this subject matter having an additional manual control.

57. Subject matter under subclass 52 responsive to temperature.

SEARCH THIS CLASS, SUBCLASS:
227+, for this subject matter when not restricted to use with vehicles.

58. Subject matter under subclass 52 responsive to tire inflation or deflation.

SEARCH THIS CLASS, SUBCLASS:
236+, for fluent material alarms of general utility.

SEARCH CLASS:
73, Measuring and Testing, subclass 388+ for fluid pressure gauges of general utility. Note in particular indented subclass 390.
116, Signals and Indicators, subclass 34 for this subject matter, when non-electrical.

59. Subject matter under subclass 52 responsive to the condition of a fluent material.

SEARCH THIS CLASS, SUBCLASS:
236+, for this subject matter when not restricted to use with vehicles.

SEARCH CLASS:
73, Measuring and Testing, subclass 290+ for liquid level gauges of general application.
116, Signals and Indicators, subclass 109+ for liquid level alarms when non-electrical, and subclass 118 for other liquid level indicators, when non-electrical.

60. Subject matter under subclass 59 responsive to the pressure or the designation of the fluent material.

SEARCH CLASS:
73, Measuring and Testing, subclass 388+, for fluid pressure gauges of general utility.
116, Signals and Indicators, subclass 70 for fluid pressure alarms when non-electrical.

61. Subject matter under subclass 52 automatically responsive to abnormal contact of the vehicle with some other object.

(1) Note. The other object may be, for example, the curb or another vehicle, but not the roadway.

SEARCH CLASS:
116, Signals and Indicators, subclass 32 for similar subject matter which is non-electrical.

62. Subject matter under subclass 52 automatically responsive to the speed of the vehicle.

(1) Note. The system, for example, may include means, when the horn button is depressed, to sound a loud horn at high speeds and a soft horn at low speeds.

63. Subject matter under subclass 52 designed to combat theft or burglary.

SEARCH THIS CLASS, SUBCLASS:
272 to 276+, for electric burglar alarms of general application.

SEARCH CLASS:
116, Signals and Indicators, subclass 33 for non-electrical vehicle burglar alarms, and subclass 75+ for other non-electrical burglar alarms.

64. Subject matter under subclass 63 controlled by the ignition circuit.

65. Subject matter under subclass 63 controlled by vibrations.

SEARCH CLASS:
200, Electricity, Circuit Makers and Breakers, subclass 61.45+ for vibration responsive switches.

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83. Subject matter under subclass 81 having two lights which flash alternately.

84. Subject matter under subclass 22 consisting of signal lights.

SEARCH THIS CLASS, SUBCLASS:
366+, for signal lights of general utility.

SEARCH CLASS:
240, Illumination, subclass 7.1+ for vehicle lighting in general.

85. Subject matter under subclass 84 having a telltale to indicate the condition of the signal lights.

SEARCH THIS CLASS, SUBCLASS:
79+, for vehicle signal systems having telltales for the signals.

86. Subject matter under subclass 84 having means to illuminate a driver's hand during hand signaling.

87. Subject matter under subclass 84 combined with other devices.

(1) Note. The signal light may, for example, be mounted on the other device.

88. Subject matter under subclass 87 having an audible signal.

89. Subject matter under subclass 87 in which the signal light is combined with another light.

SEARCH CLASS:
240, Illumination, subclass 7.1+ for vehicle lighting in general.

90. Subject matter under subclass 89 in which the other light is a portable light.

91. Subject matter under subclass 89 in which the other light is a backing light.

92. Subject matter under subclass 89 in which the other light is a head light or spot light.

93. Subject matter under subclass 89 in which the other light is a tail light.

94. Subject matter under subclass 93 having means for providing more than two indications.

(1) Note. The indications may be, for example, Go, Slow, Stop, but not merely on-off indications.

SEARCH THIS CLASS, SUBCLASS:
110+, for the plural indication vehicle signal per se.

95. Subject matter under subclass 89 in which the other light is a parking light.

96. Subject matter under subclass 87 combined with a radiator cap or hood ornament.

97. Subject matter under subclass 87 in which the signal light is combined with a windshield or window.

98. Subject matter under subclass 87 in which the signal light is combined with a mirror or reflector.

99. Subject matter under subclass 87 in which the signal light is combined with a license plate.

100. Subject matter under subclass 87 in which the signal light is combined with a fender.

101. Subject matter under subclass 87 in which the signal light is combined with a spare tire carrier.

102. Subject matter under subclass 87 in which the signal light is combined with a bumper.

103. Subject matter under subclass 84 having means for projecting an image by optical means.

(1) Note. The signal may project an image upon the roadway or upon a screen carried by the vehicle.

SEARCH CLASS:

353, Optics, Image Projectors, for image projectors of general utility.

104. Subject matter under subclass 84 having means to enable the observer to judge his distance to the signal.

(1) Note. The signal may be constructed, for example, in the fashion of an eye testing chart, with words of varying size.

SEARCH CLASS:
350, Optics, Systems and Elements, subclass 130+ for stereoscopic apparatus of general utility.

105. Subject matter under subclass 84 having a gaseous discharge lamp.

SEARCH CLASS:
240, Illumination, subclasses 11.4 and 51.11+ for the structure of gas space discharge lamps of general utility.

106. Subject matter under subclass 84 having means to indicate when it will be safe to pass the vehicle.

107. Subject matter under subclass 84 having indicia.

SEARCH THIS CLASS, SUBCLASS:
104, for this subject matter where the indicia is used for distance judging.

108. Subject matter under subclass 107 in which the indicia can be used to indicate several different indications and some of the indicia is common to several of the indications.

(1) Note. The indicia, for example, may be a phrase having different meanings when a portion thereof is visible and not visible.

109. Subject matter under subclass 108 in which the indicia is in the form of two arrows which have a common shaft.

110. Subject matter under subclass 84 having plural duplicate indications.

SEARCH THIS CLASS, SUBCLASS:
94, for this subject matter combined in a vehicle signaling system.

111. Subject matter under subclass 110 in which the number of duplicate indications is three.

112. Subject matter under subclass 110 in which the number of duplicate indications is two.

113. Subject matter under subclass 84 for use during blackouts.

(1) Note. The blackout signal may, for example, be designed so that it can be seen only on the ground and not from the air.

114. Subject matter under subclass 84 for indicating the extent of a geometrical area.

(1) Note. The signal light may, for example, serve to delimit the edge of a safety zone.

115. Subject matter under subclass 114 for delineating the outline of a vehicle.

116. Subject matter under subclass 114 which is located at the level of the street or roadway.

(1) Note. This subclass includes, for example, the familiar mushroom street markers having electrical features.

SEARCH CLASS:
116, Signals and Indicators, subclass 63, for street traffic signals not having electrical features.
404, Road Structure, Process and Apparatus, subclass 9+, for traffic directors having electrical features.

117. Subject matter under subclass 116 embedded in the pavement.

...subclass 84 in which the ... of glass.

...subclass 84 having a ...

...subclass 22 having a ... operated by an electro-...

..., SUBCLASS:
... magnet operated signals of ...

... and Sign Exhibiting, sub... similar subject matter, utilized ...

... Indicators, subclass 28+ for ... matter without the electromagnet ...

... under subclass 120 in which the ... ally moved in a wigwag manner.

... CLASS, SUBCLASS:
... subject matter where the signal is ... utility.

... matter under subclass 120 having a ... signal.

... matter under subclass 122 having plural ... indicators.

... matter under subclass 122 having a win... and means to exhibit the signal ...

... Indicators, subclass 42+ for ... matter without the electromagnet ...

... under subclass 124 in which the ... indicia carrying drum.

... under subclass 124 in which the ... signal.

127. Subject matter under subclass 120 in which the mechanical signal is pivoted.

128. Subject matter under subclass 127 in which the pivoted signal is movable to three or more positions.

129. Subject matter under subclass 128 in which the signal pivots about a vertical axis.

130. Subject matter under subclass 127 in which the pivoted signal is a swinging arm, which swings laterally with respect to the line of sight.

SEARCH THIS CLASS, SUBCLASS:
128, where the signal arm can assume 3 or more positions.

131. Subject matter under subclass 130 having plural laterally swinging arms.

132. Subject matter under subclass 130 in which the laterally swinging arm is provided with means to lock it in actuated position so that the signal may remain effective without continuous energization of the electromagnet.

133. Subject matter under subclass 127 in which the signal pivots about a vertical axis.

SEARCH THIS CLASS, SUBCLASS:
129, where the signal can be positioned in three or more positions.

134. Subject matter under subclass 22 consisting of mechanical signals, manually operated, having electrical illumination, adapted for use on bicycles.

SEARCH CLASS:
116, Signals and Indicators, subclass 62 for mechanical bicycle signals.

135. Subject matter under subclass 22 consisting of mechanical signals, manually operated, provided with electric illumination, combined with some other device.

(1) Note. The signal may, for example, be combined with a vehicle body.

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136. Subject matter under subclass 22 consisting of mechanical signals, manually operated by means of hydraulic or pneumatic means, provided with electric illumination.

(1) Note. The signal may, for example, be controlled by means of a manually operated valve in the suction line connecting engine manifold and signal operating cylinder.

137. Subject matter under subclass 22 having mechanical signals which are manually extended by means of lazy tongs and which are provided with electric illumination.

138. Subject matter under subclass 22 consisting of mechanical signals, manually operated, having electric illumination, which are pivoted.

SEARCH THIS CLASS, SUBCLASS:
373, for similar subject matter not restricted to use with vehicles.

SEARCH CLASS:
116, Signals and Indicators, subclass 132 for hand set semaphore type signals.

139. Plural signals under subclass 138.

140. Subject matter under subclass 138 in which the signal can move to three or more positions.

141. Subject matter under subclass 140 in which the signal rotates about a vertical axis.

142. Subject matter under subclass 138 in which the signal swings laterally to the line of sight.

143. Subject matter under subclass 22 consisting of mechanical signals, manually operated, having electrical illumination, in which the signal can be set to three or more positions.

SEARCH THIS CLASS, SUBCLASS:
140+, for similar subject matter where the signal is pivoted.

144. Subject matter under subclass 22 consisting of mechanical signals, manually operated, having electric illumination, in which the signal is normally encased so that it is not visible and is made visible at the will of the operator.

SEARCH THIS CLASS, SUBCLASS:
122+, for this subject matter with an electromagnet operator.

145. Subject matter under subclass 144 in which the signal is encased in a casing which has a window and the signal is made visible by being exhibited at the window.

146. Subject matter under subclass 22 consisting of mechanical signals, manually operated, having electric illumination, which move in a rectilinear manner.

146.1. Subject matter under the class definition having means for determining when signals indicative of intelligence, particularly in the form of a group, are transmitted or received without change and including means for correcting a determined change or error.

Note. This subclass does not take the checking of an art machine, for which recourse should be had to the pertinent art class.

SEARCH THIS CLASS, SUBCLASS:
146.2, for digital comparator systems.
149, for comparator systems.
163, for selective systems wherein plural devices are remotely controlled and checking means are provided to indicate proper operation of the selective system.
213+, for alarm systems having checking system for indicating proper operation.
345+, for code transmitter systems including checking means for indicating proper operation.

SEARCH CLASS:
178, Telegraphy, subclass 23, for telegraphic code error checkers.
235, Registers, subclass 153, for digital error checkers in electrical computer systems.

146.2. Subject matter under the class definition having means for comparing signals or information in digital form to determine which is the greater, the lesser or whether they are numerically equal.

Note. The digital signals are not limited to any particular radix, and may be, for example, binary, decimal, etc.

SEARCH THIS CLASS, SUBCLASS:
149, for comparator systems.

146.3. Subject matter under the class definition having means to recognize or read a physically apparent recognizable arbitrary character or group of characters by analyzing its physical conformation.

Note. The characters in this subclass are the usual letters of alphabets and numerical symbols and do not include [illegible] physical phenomena such as might be exhibited on the face of an oscilloscope. For the analysis of such phenomena, see Search Class, below.

SEARCH CLASS:
235, Registers, subclass 61.11, for character recognition systems in a computer.
324, Electricity, Measuring and Testing, subclass 77, for analysis of complex waves.

147. Subject matter under the class definition having means for controlling the operation of a device in a plurality of manners or for controlling the operation of plural devices, said control being exercised over a lesser number of communication lines than the number of different results which can be obtained by signaling over said line.

(1) Note. The distinction between selective and non selective signaling systems is analogous to the difference between multiplex and simplex communication systems.

(2) Note. Many communication and control systems have selective features and the search, in appropriate instances must extend to them. See the classes referred to under Search Classes below and under the Class Definition.

SEARCH CLASS:
70, Locks, subclass 278 for this subject matter utilized in locks.
178, Telegraphy, subclass 33+, for telegraph selectors.
179, Telephony, subclasses 16+ and 84+, for selectors used in telephony.
234, Selective Cutting (e.g., Punching), appropriate subclasses, for electrical control of a selective cutting device from a pattern, keyboard, or other input means.
246, Railway Switches and Signals, appropriate subclasses, for selective systems used in railway signaling.
334, Tuners, subclass 8+ for tuners with remote control means.

148. Subject matter under subclass 147 which is responsive to sound or speech.

(1) Note. The selector, for example, may cause two different results to ensue depending upon whether a one syllable word or a two syllable word is given in an oral command.

SEARCH CLASS:

178, Telegraphy, subclass 31+ for typewriters which automatically type out words in response to spoken words.

181, Acoustics, subclass 5, for sound responsive devices similar to those in this subclass.

149. Subject matter under subclass 147 having means for comparing items of intelligence (i.e., information) with each other, and for indicating a result in accordance with the comparison.

SEARCH THIS CLASS, SUBCLASS:

152, for similar subject matter where the intelligence is stored in the device and is supplied upon demand.

150. Subject matter under subclass 147 utilized for telemetering.

(1) Note. Telemetering is defined below in subclass 177. The control of the valve of the telemetered indication is not considered to be a selective feature for classification in this subclass, but some additional feature which is selective must be present to cause classification in this subclass.

SEARCH THIS CLASS, SUBCLASS:

177+, for this subject matter when not selective. The search must continue in indented subclass 183 if plural telemetering transmitters are connected to plural telemetering receivers over a time division multiplex line.

151. Subject matter under subclass 150 in which the telemetered indication is given in response to an interrogation.

152. Subject matter under subclass 147 for giving a response to an interrogation.

(1) Note. For example, the system may give the price of a requested stock only when such price is requested.

SEARCH THIS CLASS, SUBCLASS:

151, for similar subject matter in combination with a telemetering system.

153. Subject matter under subclass 152 relating to space reservations and space availability.

(1) Note. The space may, for example, be on a train or in a theater.

154. Subject matter under subclass 147 for giving stock quotations.

SEARCH CLASS:

176, Telegraphy, subclass 24 for similar subject matter in the printing telegraph art. The stock quotation boards in Class 340 can be used only for stock quotations, whereas the bulletin systems of Class 178 can be used for stock quotations and for other types of information as well.

155. Subject matter under subclass 147 for selecting one party on a party line.

(1) Note. Such selection may be for the purpose of calling the party or for other purposes.

SEARCH CLASS:

178, Telegraphy, subclass 2+ for party line telegraph systems having party line selection.

179, Telephony, subclasses 17 and 28+ for party line telephone systems having party selection, and subclass 84+ for telephone calling systems, some of which are selective.

343, Communications, Radiant Energy, subclasses 175+ and 200- for radio systems having selective signaling.

156. Subject matter under subclass 155 in which the selection is in accordance with a variable frequency signal.

157. Subject matter under subclass 155 in which the selection is in accordance with a series of impulses.

(1) Note. The impulses may, for example, cause stepping of a stepping switch.

SEARCH CLASS:

179, Telephony, subclass 16+ for stepping switches utilized in telephony, and subclass 85 for step by step calling systems used in telephony.

335, Electricity, Magnetically Operated Switches, Magnets and Electromagnets, subclass 107+ for stepping switches of the type similar to those used as telephone selectors with multiple contacts and subclass 138+ for step-by-step electromagnetically operated switches in which final contact opening or closing is accomplished in steps or increments.

158. Subject matter under subclass 157 in which the selective means is responsive to the amplitude or the polarity of the pulses.

159. Subject matter under subclass 157 relating to the selector or indicator per se.

160. Subject matter under subclass 155 in which the selector is controlled by the amplitude or the polarity of the signal.

SEARCH CLASS:

179, Telephony, subclass 86 for telephone call systems controlled in accordance with a strength and polarity of the calling signals.

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161. Subject matter under subclass 160 relating to the selector or indicator, per se.

SEARCH CLASS:
335, Electricity, Magnetically Operated Switches, Magnets and Electromagnets, subclass 78+ for polarized switches, subclass 107+ for selective switches which are electromagnetically operated, subclass 138+ for step-by-step switches and subclass 230+ for polarized electromagnetic relays, per se.

162. Subject matter under subclass 147 for controlling a phonograph or a radio.

SEARCH CLASS:
274, Sound Recording and Reproducing, subclass 10 for mechanical juke boxes.

163. Subject matter under subclass 147 in which plural devices are controlled at the receiver.

(1) Note. This subclass contains, for example, selective systems for controlling a remote and un-manned power substation.

164. Subject matter under subclass 147 for controlling an alarm.

SEARCH THIS CLASS, SUBCLASS:
213+, for non-selective alarms automatically responsive to a condition.

165. Subject matter under subclass 147 having a cathode ray tube.

SEARCH CLASS:
315, Electric Lamp and Discharge Devices, Systems, subclass 1+ for cathode ray circuits of general applications.

166. Subject matter under subclass 147 in which the selector consists of two crossed gratings having a plurality of responsive means located at the intersections of the conductors of one grating and the conductors of the other grating, said responsive devices being selectively energizable by selective energization of the conductors of the two gratings.

167. Subject matter under subclass 147 responsive to pulses.

SEARCH CLASS:
329, Demodulators and Detectors, subclass 104+, for pulse demodulators.

168. Subject matter under subclass 167 in which the pulse responsive device counts the number of pulses received.

SEARCH CLASS:
235, Registers, subclass 92 for electrically operated counters.
307, Electrical Transmission or Interconnection Systems, subclass 220+ for transistor or non-linear conductor devices forming electrical pulse counting circuits or chains and not elsewhere classifiable.
315, Electric Lamp and Discharge Devices, Systems, subclass 8.5+ for cathode ray tube systems forming electrical pulse counting circuits, and subclass 84.5+ for similar electrical pulse counting circuits utilizing gaseous space discharge devices.
317, Electricity, subclass 140 for electrical pulse responsive plural electromagnetic relay systems of the sequentially operated type and which may form counting chains.
328, Miscellaneous Electron Space Discharge Device Systems, subclass 41+, for miscellaneous electron tube systems useful for counting purposes.

169. Subject matter under subclass 167 in which the selective means is responsive to the amplitude of the pulses.

170. Subject matter under subclass 147 in which the selective means is responsive to the phase of the controlling signal.

171. Subject matter under subclass 147 in which the selective means is responsive to the frequency of a signal.

SEARCH CLASS:
333, Wave Transmission Lines and Networks, subclass 70+ for wave filters.

172. Subject matter under subclass 147 in which the selective means is responsive to the amplitude of the signal.

SEARCH CLASS:
333, Wave Transmission Lines and Networks, subclass 20 for wave shaping networks of the passive type.

172.5. Subject matter under subclass 147 wherein the system includes either a data processing system or an intelligence storage system comprising a plurality of storage devices which are dissimilar either in function or in structure, or a combination of a data processing system with an intelligence storage system.

(1) Note. A date processing system is one wherein incoming data is changed in form so that it can be used by other equipment. Such change might be the combination of data elements, separation of data elements, change of radix, etc. Compare with code conversion systems, subclass 347, this class.

(2) Note. This subclass does not include intelligence storage systems comprising plural storage elements unless such elements differ either in function or structure. Plural similar storage elements are classified in their particular subclasses.

(3) Note. The data processing systems of this subclass are deemed to be subcombinations of the electrical calculator data processing systems of Class 235. However, calculators of the Class 235, subclass 156 type which include an internal program element, i.e., cycling and or programming structure for altering the normal operation of the machine, are classified in this subclass (340/172.5). Such structure includes, for example, devices for skip instruction, machine timing cycle modification, computing new instruction or altering instruction using initial computed result.

SEARCH THIS CLASS, SUBCLASS:
173+ and 174+, for particular storage elements or storage systems which are subcombinations of the storage systems classified herein.
347, for code conversion systems.

SEARCH CLASS:
235, Registers, appropriate subclasses, for data processing systems in combination with computers.
315, Electric Lamp and Discharge Devices, Systems, subclasses 8.5+ and 84.5+, for storage systems of the type involving cathode ray tubes and gaseous discharge tubes respectively.
328, Miscellaneous Electron Space Discharge Device Systems, subclass 121+, for miscellaneous electron discharge tube storage systems.

173. Subject matter under subclass 147 wherein the system is an intelligence storage system comprising a single type of intelligence storage element as classified in this class.

(1) Note. This is the generic place for classification of electrical signal storage systems.

SEARCH CLASS:
234, Selective Cutting (e.g., Punching), subclass 55+ for a selective cutting device having storage means for signals (in original code or altered code), and various modes of read-out to the tool selectors.
235, Registers, subclass 61.12 for punch card systems involving storage.
315, Electric Lamp and Discharge Devices, Systems, subclass 8.5+, for gaseous cathode ray storage systems.
320, Electricity, Battery and Condenser Charging and Discharging, subclass 1, for storage of electrical energy involving condenser charging and discharging.
328, Miscellaneous Electron Space Discharge Device Systems, subclass 121+, for miscellaneous electron discharge tube storage systems.

173.1. Subject matter under subclass 173 wherein the storage element is one which has the characteristic of a finite substantial electrical resistance at normal temperatures and zero or substantially zero resistance at very low temperatures, the change in resistance being used to indicate the presence or absence of a bit of intelligence.

(1) Note. This subclass includes systems wherein the information is stored by means of a persistent current in a superconductive ring.

SEARCH CLASS:
307, Electric Transmission or Interconnection Systems, subclasses 245, 277 and 306+ for solid state device circuits including superconductive elements.
338, Electrical Resistors, for electrical resistors which may be superconductive.

173.2. Subject matter under subclass 173 wherein the storage element is in an electrostatic device having the form of a condenser wherein the electrodes are separated by a dielectric having the property of being stable in either condition of charge.

SEARCH CLASS:
317, Electricity, subclass 242+, for ferroelectric condensers per se.

174. Subject matter under subclass 173 wherein the storage element is a magnetic element which indicates the information but stored by the charged state of the magnetic element; and also the storage element per se.

(1) Note. An example of a magnetic element in this subclass is a magnetic core element.

SEARCH CLASS:
307, Electrical Transmission or Interconnection Systems, subclass 88, for non-linear reactor systems generally.
323, Electricity, Voltage Magnitude and Phase Control Systems, subclass 80, for voltage magnitude control systems with saturating windings.
330, Amplifiers, subclass 63, for magnetic amplifiers.

174.1. Subject matter under subclass 174 wherein the storage and readout of the information from the magnetic element require relative movement between the magnetic element and a transducer in which a voltage indicative of the state of the magnetic element is induced such as drum, disc, and tape storage systems; and also the magnetic storage element per se and the transducer per se.

SEARCH CLASS:
179, Telephony, subclass 100.2, for magnetic recording and readout of sound.
242, Winding, and Reeling, subclass 179+, for the winding device for traversing magnetic tape past a transducer in storage and readout apparatus.
346, Recorders, subclass 74, for magnetic recording generally.

175. Subject matter under subclass 147 having a space discharge tube.

SEARCH CLASS:
315, Electric Lamp and Discharge Devices, Systems, for miscellaneous gas discharge tube circuits.
328, Miscellaneous Electron Space Discharge Device Systems, subclass 69+, for miscellaneous electron tube control systems.

176. Subject matter under subclass 147 having a rectifier.

177. Subject matter under the class definition for giving an indication, at the receiving station, which is substantially continuous from a lower value to an upper value, said indication being under the control of the transmitter, said control being exercised over the electric circuit.

(1) Note. The word "continuous", as used in the above definition, refers to the characteristic under which the value indicated is quantitative rather than qualitative; thus, for example, a system which indicates temperature in degrees is classified in this and indented subclasses, but a system which indicates temperature merely by designations such as "hot", "medium" and "cold" is not classified here.

(2) Note. The quantity whose value is telemetered is usually measured in a testing operation. This subclass however, takes only those telemetering systems which are not provided for in the testing classes. See the subclasses referred to below under Search Class.

(3) Note. This subclass includes, in addition to automatically responsive telemetering systems, those in which the quantity to be telemetered is determined by a manual operation; for example, the desired as well as the actual temperature of an auditorium may be telemetered from the auditorium to the heat control room.

SEARCH CLASS:
73, Measuring and Testing, appropriate subclasses, for mechanical testing in combination with telemetering systems to indicate the result of the test.
324, Electricity, Measuring and Testing, appropriate subclasses for electrical testing combined with telemetering systems to indicate the result of the test.
333, Wave Transmission Lines and Networks, subclass 1+ for plural channel wave transmission lines and networks.

178. Subject matter under subclass 177 combined with means for performing some calculation.

(1) Note. The system, for example, may be provided with means to furnish an indication on a logarithmic basis.

SEARCH CLASS:
235, Registers, subclass 61+ for calculators in general, especially subclass 150+ for electrical calculators.

179. Subject matter under subclass 178 having plural transmitters, sensing points or inputs to the telemetering system.

(1) Note. The system, for example, may be provided with means to indicate the sum of a plurality of inputs or the ratio between two inputs.

180. Subject matter under subclass 177 in which the telemetering system is combined with some other type of systems.

SEARCH THIS CLASS, SUBCLASS:
150+, where the telemetering system is combined with a selective system.

181. Subject matter under subclass 180 in which the telemetering system is combined with an alarm or an annunciator.

182. Subject matter under subclass 177 having plural transmitters, sensing points, or inputs.

SEARCH THIS CLASS, SUBCLASS:
179, where the final output of the telemetering systems provides an indication which is a mathematical representation of some input.

183. Subject matter under subclass 182 in which the plural transmitters are periodically connected to the line in sequence.

SEARCH THIS CLASS, SUBCLASS:
147+, for selective systems in general. The search for the subject matter of subclass 183 must continue in indented subclass 15 to be complete.

SEARCH CLASS:
179, Telephony, subclass 15 and the search notes thereto for multiplex systems in other communication arts.

184. Subject matter under subclass 182 having plural receivers.

(1) Note. Consult the search note to subclass 12 above.

185. Subject matter under subclass 177 in which the telemetering system has plural receivers.

SEARCH THIS CLASS, SUBCLASS:
184, for this subject matter having plural transmitters.

186. Subject matter under subclass 177 having means to feedback a signal from the receiver to the transmitter.

(1) Note. The feedback, for example, may be negative feedback, used to improve the stability of the system.

187. Subject matter under subclass 186 in which the feedback means actuate a follow-up means at the transmitter or receiver.

(1) Note. The follow-up means may, for example, rebalance the system so as to reduce the feedback to zero.

SEARCH CLASS:
318, Electricity, Motive Power Systems, subclass 560+ for electric motor rebalancing systems.

188. Subject matter under subclass 177 having plural circuits between the transmitter and the receiver, each circuit being used to designate a particular quantity.

(1) Note. To be classifiable as a telemetering system, the subject matter must have a sufficient number of indications so as to be substantially continuous. Thus, for example, a system which has three indications to indicate, for example "plenty", "little" and "in between" would not be classified as a telemetering system, but as a signaling system, for classification in subclass 213+ or 286+ of this class.

189. Subject matter under subclass 177 in which the intelligence is transmitted from the transmitter to the receiver by means of radiant energy means.

(1) Note. The radiant energy means, for example, may be an infra red means.

SEARCH CLASS:
250, Radiant Energy, subclass 199 for light ray radio telephony and radio telegraphy systems.

190. Subject matter under subclass 189 in which the radiant energy beam is sensed by a photoelectric cell.

SEARCH CLASS:
250, Radiant Energy, subclass 200+ for photoelectric cell devices and circuits.

191. Subject matter under subclass 177 in which the transmitter has a piezoelectric device.

SEARCH CLASS:
310, Electrical Generator or Motor Structure, subclass 8+ for piezoelectric devices.

192. Subject matter under subclass 177 in which the transmitter is a dynamoelectric generator.

SEARCH CLASS:
310, Electrical Generator or Motor Structure, subclass 10+ for dynamoelectric generator structure.

194. Subject matter under subclass 177 having a transmitter which has an element which is periodically clamped and released by a bail.

(1) Note. The bail may, for example, release and clamp a meter pointer against a continuous resistant, so that the pointer serves as the movable tap of a potentiometer.

195. Subject matter under subclass 177 in which the transmitter has an inductor.

SEARCH CLASS:
336, Inductor Devices, appropriate subclasses for the structure of transformers and inductive reactors.

196. Subject matter under subclass 195 in which the inductor is a mutual inductance.

197. Subject matter under subclass 196 in which the mutual inductance is controlled by variably saturating the magnetic circuit.

(1) Note. The saturation may be produced, for example, by a movable saturating magnet or by the earth's magnetic field.

198. Subject matter under subclass 196 in which the mutual inductance has a stator and a rotor which tend to line up magnetically.

(1) Note. This subclass, for example, contains the familiar selsyn systems.

SEARCH CLASS:
318, Electricity, Motive Power Systems, subclass 690+ for selsyn type electric motor systems and subclass 654+ and 661 for electric motor systems controlled by a selsyn system.

199. Subject matter under subclass 196 in which the mutual inductance contains two parts and in which the magnetic flux in the two parts flows through a common portion in differential relationship.

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200. Subject matter under subclass 177 in which the transmitter has a variable capacitor.

SEARCH CLASS:
317, Electricity, subclasses 246+ and 249+ for variable capacitors.

201. Subject matter under subclass 177 in which the telemetering system is responsive to some condition.

SEARCH THIS CLASS, SUBCLASS:
213+, for alarms which are automatically responsive to a condition.

202. Subject matter under subclass 201 in which the telemetering system is automatically responsive to the condition of a radio dial.

SEARCH CLASS:
116, Signals and Indicators, subclass 124.1+ for radio dials per se.
346, Recorders, subclass 37 for recorders for recording the position of radio dials.

203. Subject matter under subclass 177 in which the intelligence is transmitted by means of pulse modulation.

(1) Note. Consult the search notes to Class 332 for a definition of pulse modulation.

SEARCH CLASS:
325, Modulated Carrier Wave Communication Systems, subclass 38+ for systems employing pulse modulation and subclass 321+ for pulse modulation type receivers.
332, Modulators, subclass 9+ for pulse modulation. (See (1) Note above).

204. Subject matter under subclass 203 in which the pulse modulation is a permutation code.

(1) Note. See the search notes under subclass 203 above.

SEARCH CLASS:
332, Modulators, subclass 11 for permutation code modulators.

205. Subject matter under subclass 203 in which the pulse modulation consists of two types of pulses, one type to signify increase of quantity telemetered and the other type to signify a decrease of quantity telemetered.

(1) Note. The pulses may differ, for example, by being of different polarity, or they may be sent over two different channels and be of the same polarity.

206. Subject matter under subclass 203 in which the pulse length and/or the spacing is varied.

207. Subject matter under subclass 177 in which the intelligence is transmitted over the telemetering systems by means of phase or frequency modulation.

(1) Note. Consult the definition of Class 332 for the definition of phase or frequency modulation.

SEARCH CLASS:
332, Modulators, subclass 16+ for phase or frequency modulators per se.

208. Subject matter under subclass 207 consisting of the transmitter per se.

SEARCH CLASS:
332, Modulators, subclasses 2 and 16+ for this subject matter, IN ORDER TO COMPLETE THE SEARCH.

209. Subject matter under subclass 177 in which the intelligence is transmitted over the telemetering systems by means of amplitude modulation.

(1) Note. Consult the definition of Class 332, Modulators, for the definition of amplitude modulation.

SEARCH CLASS:
332, Modulators, subclass 31+ for amplitude modulators per se. (See (1) Note above).

210. Subject matter under subclass 177 having means to regulate the supply voltage or to compensate for changes in supply voltage.

SEARCH CLASS:
323, Electricity, Voltage Magnitude and Phase Control Systems, for means for regulating voltage and/or current.

211. Subject matter under subclass 177 having a repeater or an amplifier.

SEARCH CLASS:
179, Telephony, subclass 170 for repeaters used in telephony.
330, Amplifiers, appropriate subclasses for amplifier systems, generally.

212. Subject matter under subclass 177 having a space discharge device.

SEARCH CLASS:
313, Electric Lamp and Discharge Devices, appropriate subclasses, for space discharge devices per se.
315, Electric Lamp and Discharge Devices, Systems, appropriate subclasses, for cathode ray and gas tube circuits per se.
328, Miscellaneous Electron Space Discharge Device Systems, appropriate subclasses, for electron space discharge device systems of general application.

213. Subject matter under the class definition automatically responsive to and controlled by some condition.

(1) Note: This subclass includes, for example, alarms which are automatically operated in response to some condition, such as excessive temperature.

(2) Note: The class definition of this class, under SEARCH CLASS, refers to the many other classes which contain alarms and indicators.

SEARCH CLASS:
85, Driven, Headed and Screw-Threaded Fastenings, subclass 62 for signaling devices incorporated as part of a fastening device for use in situ.
116, Signals and Indicators, appropriate subclasses, especially subclasses 67+ and 114+ for non-electrical alarms and indicators which are automatically responsive to a condition.
200, Electricity, Circuit Makers and Breakers, appropriate subclasses under subclass 52 for circuit makers and breakers whose controllers are responsive to a condition.
234, Selective Cutting (e.g., Punching), subclass 22+, for a selective cutting device having means responsive to a given operating condition (or malfunction) to impose an auxiliary control thereon.
307, Electrical Transmission or Interconnection Systems, subclasses 86+, 97, 99, 116+ and 152, for electrical transmission and switching systems which are responsive to a condition.
315, Electric Lamp and Discharge Devices, Systems, subclass 129+, for electric lamp or discharge systems with a signal, indicator, or alarm.
317, Electricity, subclass 9+, for safety and protection systems which may be condition responsive; subclass 123+, for electrical relay systems; and subclass 246+, for capacitors which are automatically responsive or non-responsive to a condition.
328, Miscellaneous Electron Space Discharge Device Systems, subclass 1+, for electron space discharge systems responsive to a non-electrical external condition.
331, Oscillators, subclass 65+ for electric oscillation generators combined with means responsive to an external physical condition.
336, Inductor Devices, subclass 30, for inductors with condition responsive adjusting means.
338, Electrical Resistors, subclass 13+, for resistors whose resistance value is responsive to a condition.

213.1 Subject matter under subclass 213 wherein means are provided to sense a condition at a remote office and to send a signal in response to the condition so sensed to a central office to cause an indication there, together with means at the central office to effect a change in this indication to further indicate that the condition exists and has been noted.

(1) Note: Acknowledgement exists when the remote office sends an alert signal in response to the sensed condition to the central office where the signal is indicated; and the central office then responds with an acknowledgement signal (which may or may not return to the remote office), which causes a change in the indication at the central office. This should be distinguished from "interrogation" which occurs when the controller at the central office sends an interrogating signal such as pulse or code to the remote office; and the remote office returns a signal indicative of the original signal and any intervening disturbances. This should also be distinguished from "answerback" which occurs

when the remote office sends a control or alarm signal to the central office, and the central office returns a signal indicative of the successful completion of the control or alarm function.

SEARCH THIS CLASS, SUBCLASS:
226, for answerback systems. See also (1) Note above.
327, for plural communication systems with sound signal cut-off.
408, for interrogator-responder systems. See also (1) Note above.

SEARCH CLASS:
178, Telegraphy, subclass 69, for circuit maintenance and monitoring in telegraph systems.

213.2 Subject matter under subclass 213.1 wherein means is provided to give an additional indication at the central office, after acknowledgement as defined above, that the sensed condition is further changed (e.g., corrected, removed or worsened).

(1) Note: The additional indication may be caused by an additional signal, or a return of the original signal (as defined in subclass 213.1 above) to normal. However, for classification here more than a mere inherent return of the indication to normal is necessary. Usually means is provided to reset the system to normal indication.

214. Subject matter under subclass 213 including means to test the system for proper operation.

SEARCH CLASS:
431, Combustion, subclass 24+ for a condition responsive burner control having a test circuit checking or analyzing a flame sensing circuit for malfunction.

215. Subject matter under subclass 213 in which the transmitter is of the signal box type and is automatically responsive to a condition.

(1) Note: The signal box may be of the type which is used in fire alarms, police, district telegraph, messenger box, or the like systems. The transmitter usually is a code transmitter.

SEARCH THIS CLASS, SUBCLASS:
287+, for signal box systems which are not automatically responsive to a condition.

216. Subject matter under subclass 215 combined with some other subject matter.

(1) Note: The automatically responsive signal box systems may, for example, be combined with a power line system over the conductors of which the alarm signal is sent.

217. Subject matter under subclass 215 provided with means for preventing the transmission of signals from any other box or other signals from the same box while any signal is being transmitted therefrom and until such signal is completed.

SEARCH THIS CLASS, SUBCLASS:
295, for this subject matter when not automatically responsive to a condition.

SEARCH CLASS:
179, Telephony, subclass 30+ for telephone party line systems having lock-out provision.

218. Subject matter under subclass 215 having a separate local thermal circuit to actuate the signal box system.

SEARCH THIS CLASS, SUBCLASS:
305+, for this subject matter when the local circuit is not automatically responsive to a condition.

219. Subject matter under subclass 215 in which the signal box system has a motor which is released by the fusing of a fusible member.

SEARCH CLASS:
116, Signals and Indicators, subclass 106 for mechanical thermal alarms which are responsive to the fusing of a fusible member.

220. Subject matter under subclass 213 combined with other subject matter.

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221. Subject matter under subclass 220 where the automatically responsive system is combined with a camera or a phonograph.

(1) Note: The automatically responsive system may, for example, in addition to sounding an alarm, turn on a phonograph to frighten away a burglar or trip a camera shutter in order to take a picture of him.

222. Subject matter under subclass 213 in which the automatically responsive system is combined with means to control the condition to which it responds.

(1) Note: The automatically responsive system of this subclass may, for example, be responsive to an abnormal condition of a machine and if the alarm is ignored by the operator of the machine, the automatically responsive system may shut the machine down.

(2) Note: In order to complete the search for the subject matter of this subclass, the search should continue in the classes that relate to the control of the condition to which the system is responsive.

223. Subject matter under subclass 213 in which the automatically responsive system is responsive to the particular sequence of operation of plural devices.

224. Subject matter under subclass 416 in which the automatically responsive system includes a radio link.

SEARCH CLASS:
325, Modulated Carrier Wave Communication Systems, subclass 26+ for the radio link, per se.
343, Communications, Radio Wave, appropriate subclasses for radio wave communication systems in general.

225. Subject matter under subclass 213 in which the indicator which exhibits the result of the sensing of a condition simulates the environment in which the condition occurs.

(1) Note: The indicators in this subclass may, for example, be built in the manner of a model of a building and have a red light flash at an appropriate point in the model to signify the location of a fault, such as lack of heat, at the corresponding point in the building.

226. Subject matter under subclass 213 wherein the monitored remote station sends a control or alarm signal to initiate a control or alarm at the central station, and the central station answers or replies with a signal indicative of successful completion of the control or alarm at the central station.

(1) Note: See subclass 213.1+ above for acknowledgement systems and (1) Note thereunder for the distinction between acknowledgement and answerback systems.

SEARCH THIS CLASS, SUBCLASS:
213.1+, for acknowledgement systems.
298 and 313+, for answerback systems generally.
408, for interrogator-responder systems.

227. Subject matter under subclass 213 in which the automatically responsive system responds to temperature, flame or radiant energy.

SEARCH CLASS:
73, Measuring and Testing, subclass 339+, for mechanical thermometers, per se.
116, Signals and Indicators, subclasses 101+ and 114.5 for mechanical thermal alarms and indicators.
328, Miscellaneous Electron Space Discharge Device Systems, subclasses 2, 3 and 6 for electron space discharge systems responsive to light, temperature and flame respectively.
329, Demodulators and Detectors, subclass 202, for demodulators or detectors of the thermal change type.
331, Oscillators, subclass 66 for electric oscillation generators combined with condition sensing means responsive to temperature or light energy changes and wherein some characteristic (e.g., wave amplitude or frequency) of the generator is varied by the condition sensing means.
431, Combustion, subclass 13+ for a burner having a signal or indicator and subclass 75+ for a burner controlled by a combustion zone sensor.

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227.1 Subject matter under subclass 227 wherein the sensor converts the sensed thermal energy into mechanical energy, or where the sensor at least permits some mechanical modification.

(1) Note. An example of this subject matter is in a thermally operated electrical switch where the switch contacts move in response to heat.

SEARCH CLASS:

337, Electricity, Electrothermally or Thermally Actuated Switches, subclass 298 for thermal electric switches.

228. Subject matter under subclass 227 wherein the sensor converts the sensed energy directly to a voltage or modifies directly an electric current.

(1) Note: The system may, for example, indicate when a flame goes out.

SEARCH CLASS:

250, Radiant Energy, subclass 200+ for photoelectric circuits and devices.

313, Electric Lamp and Discharge Devices, subclass 53 for the structure of space discharge devices in which the current is conducted through a flame and subclass 94+ for photosensitive space discharge devices.

356, Optics, Measuring and Testing, subclass 43+ for photoelectric optical pyrometers, subclass 51 for apparatus to detect and indicate the intensity or frequency of infrared or ultra-violet radiation alone by optical principles or in combination with apparatus to detect visible light simultaneously or sequentially as a single test instrument or as plural test apparatus, subclass 87 for flame spectrophotometers, subclass 187 for flame photometers and subclass 218+ for photoelectric type photometers.

228.1 Subject matter under subclass 228 in which the sensor responds to the ionization or rectification properties of a flame.

SEARCH CLASS:

328, Miscellaneous Electron Space Discharge Device Systems, subclass 6, for electron tube systems which are flame responsive, as where the flame acts as a rectifier in the circuit.

228.2 Subject matter under subclass 227 wherein the sensing means is responsive to the flicker frequency of a flame (usually 3 to 30 C.P.S.).

SEARCH THIS CLASS, SUBCLASS:

171, for frequency responsive systems in general.

229. Subject matter under subclass 227.1 in which the temperature, flame or radiant energy is detected by means of a transducer which converts the quantity being sensed into variable fluid pressure.

230. Subject matter under subclass 227.1 in which the system is responsive to the temperature of an incubator.

SEARCH CLASS:

119, Animal Husbandry, subclass 35+ for animal incubators, per se.

231. Subject matter under subclass 227.1 in which the automatically responsive system responds to the temperature of a bearing.

SEARCH CLASS:

308, Machine Elements, Bearings and Guides, appropriate subclasses for bearings, per se.

232. Subject matter under subclass 227.1 in which the condition is sensed by means of a tensioned cord.

233. Subject matter under subclass 227 having a sensor in a Wheatstone bridge.

SEARCH CLASS:

323, Electricity, Voltage Magnitude and Phase Control Systems, subclass 74+ for Wheatstone bridges, per se.

324, Electricity, Measuring and Testing, appropriate subclasses, especially subclass 57+, for electrical testing systems using Wheatstone bridges.

234. Subject matter under subclass 213 in which the automatic condition sensing system responds to formation of ice.

SEARCH THIS CLASS, SUBCLASS:
29, for similar subject matter utilized for navigation, such as iceberg presence alarms.

SEARCH CLASS:
62, Refrigeration, subclass 128 for a refrigerator with atmospheric condensation, e.g., a frost indicator.

235. Subject matter under subclass 213 in which the automatic condition responsive means responds to moisture or humidity.

SEARCH CLASS:
73, Measuring and Testing, subclass 335+ for mechanical hygrometers.
324, Electricity, Measuring and Testing, subclasses 61 and 65 for electrical moisture and humidity testing.

236. Subject matter under subclass 213 responsive to the condition of a fluent or pulverized material or of the fluent material handling devices.

SEARCH THIS CLASS, SUBCLASS:
228, for this subject matter having radiant energy means, such as photocells, to sense the fluid.

237. Subject matter under subclass 236 in which the system responds to the condition of a gas or smoke.

SEARCH THIS CLASS, SUBCLASS:
228, for this subject matter having radiant energy means, such as photocells, to sense the gas or smoke.

SEARCH CLASS:
250, Radiant Energy, subclass 218 for photoelectric cell apparatus in which the light pass to the photocell goes through a fluent medium.
356, Optics, Measuring and Testing, subclass 74 for the spectroscopic analysis of gas or smoke, subclass 102 for the determination of particle size, subclass 103+ for particle light scattering tests, subclass 173+ for colorimetry tests involving gas or smoke, and subclass 207 for light transmission tests of dust or smoke.

238. Subject matter under subclass 236 in which the system is automatically responsive to the condition of a valve.

SEARCH CLASS:
137, Fluid Handling, subclass 554 for this subject matter IN ORDER TO COMPLETE THE SEARCH.
251, Valves and Valve Actuation, appropriate subclasses for the structure of valves.

239. Subject matter under subclass 236 in which the automatically responsive system responds to the flow of the fluid or pulverized material.

SEARCH CLASS:
73, Measuring and Testing, subclasses 188+ and 194+ for mechanical means for testing the amount of fluid or direction of fluid flow.
116, Signals and Indicators, subclasses 112 and 117 for mechanical signals and indicators for indicating the flow of fluids.
137, Fluid Handling, subclass 551+ for this subject matter IN ORDER TO COMPLETE THE SEARCH.

240. Subject matter under subclass 239 in which the flow of fluid is detected by means of a concomitant pressure variation.

(1) Note. The fluid, for example, may be released when hollow jail bars are sawed by escaping prisoners and the resulting drop in pressure may sound an alarm.

241. Subject matter under subclass 240 in which the pressure results from the wind.

242. Subject matter under subclass 239 in which the flow results from a leak.

SEARCH CLASS:
73, Measuring and Testing, subclass 40+ for leak detecting in general.

243. Subject matter under subclass 239 in which the system is automatically responsive to the stoppage of flow in a pipe or conduit.

SEARCH CLASS:
137, Fluid Handling, subclass 551+ for similar subject matter.

244. Subject matter under subclass 236 responsive to the level of the fluent material.

SEARCH CLASS:
73, Measuring and Testing, subclass 290+ for liquid level or depth gauges.
116, Signals and Indicators, subclasses 109+ and 118+ for mechanical liquid level signals or indicators.

245. Subject matter under subclass 244 responsive to the flowing-over of a full container.

246. Subject matter under subclass 244 responsive to the level of material in a bin.

SEARCH CLASS:
222, Dispensing, subclass 23+ for bins of the dispensing type having level indicators.

247. Subject matter under subclass 244 having means for mechanically sensing the depth of liquid and giving an electric indication whenever the mechanical sensing means touches the bottom of the liquid or its upper surface.

SEARCH CLASS:
33, Geometrical Instruments, subclass 120+ for sounding leads and ullage rods not having electrical signals.

248. Subject matter under subclass 213 responsive to the condition of some electrical apparatus.

SEARCH CLASS:
330, Amplifiers, subclass 2 for amplifiers having signals or indicators responsive to some condition of the amplifier.

249. Subject matter under subclass 248 in which the system is automatically responsive to the condition of a battery.

SEARCH CLASS:
136, Batteries, subclass 182 for this subject matter, IN ORDER TO COMPLETE THE SEARCH.

250. Subject matter under subclass 248 for indicating the condition of a fuse.

SEARCH CLASS:
200, Electricity, Circuit Makers and Breakers, subclass 167 for indicators for electric switches and fuses.
337, Electricity, Electrothermally or Thermally Actuated Switches, subclass 206 for fusible element actuated switches with condition indicating means, subclass 241 for cartridge type fuses with indicators and 265 for plug fuses with indicators.

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251. Subject matter under subclass 248 for indicating the condition of an electric light.

(1) Note. The system may, for example, indicate when the electric light burns out.

SEARCH THIS CLASS, SUBCLASS:
228, for this subject matter when the system has photoelectric means for responding to the radiant energy output of the light. This subclass (251) contains only those where the response is not to radiant energy.

252. Subject matter under subclass 248 in which the indicator for the system is a pilot light.

SEARCH THIS CLASS, SUBCLASS:
80, for this subject matter where the pilot light is in a vehicle.

253. Subject matter under subclass 248 responsive to electric currents or voltage.

(1) Note. The system may, for example, indicate a line fault.

254. Subject matter under subclass 253 in which the voltage is in an electric fence system.

SEARCH CLASS:
256, Fences, subclass 10 for electric fences.

255. Subject matter under subclass 253 responsive to the existence of a ground on an electric circuit.

SEARCH CLASS:
324, Electricity, Measuring and Testing, subclass 51+ for testing devices for detecting the presence of ground on an electric circuit. The testing devices in Class 324 are of the type which are temporarily connected to the system being tested while those in Class 340 are of the type which are continuously connected to the system being tested.

256. Subject matter under subclass 253 automatically responsive to the breaking of a normally closed circuit.

SEARCH THIS CLASS, SUBCLASS:
214, for automatic systems with means to sound an alarm if the system is faulty.
215+, for signal box systems.
272 to 277 for various types of burglar alarms.

258. Subject matter under subclass 213 automatically responsive to the approach of a person or article.

(1) Note. The presence of the article or person is usually detected by means of the capacity effects, but not necessarily so.

SEARCH THIS CLASS, SUBCLASS:
228, for this subject matter having photoelectric pick up means.

259. Subject matter under subclass 213 automatically responsive to the feeding of web, sheet or work.

SEARCH CLASS:
221, Article Dispensing, subclass 2+ for article dispensers not otherwise provided for having signals and indicators including signals to indicate the position of a follower or to indicate the level of a supply source of articles.
226, Advancing Material of Indeterminate-Length, subclass 10+ for a device controlling the advance of web or strand in response to the condition thereof.
242, Winding and Reeling, appropriate subclasses for web, winding and reeling mechanisms.
271, Sheet Feeding or Delivering, appropriate subclasses for sheet feeding and delivering.

260. Subject matter under subclass 259 in which the web is a motion picture film.

SEARCH CLASS:
352, Optics, Motion Pictures, subclass 12+ for speed synchronization between picture and sound carrier webs, and subclass 143+ for fire prevention mechanisms controlled by a motion picture web.

261. Subject matter under subclass 213 automatically responsive to vibrations.

SEARCH THIS CLASS, SUBCLASS:
8+, for underwater vibration transducers. Also consult the search notes to subclass 8 for the other classes which contain pertinent subject matter.

SEARCH CLASS:
73, Measuring and Testing, subclass 67+ for mechanical measuring or testing by means of vibration.

262. Subject matter under subclass 213 automatically responsive to acceleration or deceleration.

263. Subject matter under subclass 213 automatically responsive to velocity.

SEARCH CLASS:
73, Measuring and Testing, subclass 488+ for a mechanical or magnetic speed indicator.

264. Subject matter under subclass 263 having a centrifugal governor.

SEARCH CLASS:
73, Measuring and Testing, subclass 535+ for a centrifugal governor per se.

265. Subject matter under subclass 213 automatically responsive to a geometrical shape or dimension.

SEARCH CLASS:
33, Geometrical Instruments, subclass 174+ for geometrical gauges.

266. Subject matter under subclass 213 automatically responsive to the position of a pointer on a scale.

(1) Note. The pointer may, in turn be automatically actuated by a condition, or it may be manually set. In the latter case, in order to be classified here, the pointer must primarily control some other device, and only secondarily control the signaling system.

SEARCH THIS CLASS, SUBCLASS:
177+, for telemetric quantitative systems.

267. Subject matter under subclass 213 automatically responsive to the condition of a machine.

(1) Note. A machine is defined as a device having a mechanical movement of the Class 74 type in combination with means to utilize the motion.

268. Subject matter under subclass 267 for indicating synchronism between mechanism.

SEARCH CLASS:
307, Electrical Transmission or Interconnection Systems, subclass 87 for automatically responsive synchronizing systems to synchronize two generators.
318, Electricity, Motive Power Systems, subclass 85 for synchronizing systems for synchronizing plural electric motors.

269. Subject matter under subclass 267 for indicating the condition of a bearing.

SEARCH THIS CLASS, SUBCLASS:
231, for this subject matter when the system is automatically responsive to the temperature of the bearing.

SEARCH CLASS:
308, Machine Elements, Bearings and Guides, appropriate subclasses for bearings in general.

270. Subject matter under subclass 267 automatically responsive to the lubrication of the machine.

SEARCH THIS CLASS, SUBCLASS:
236+, for this subject matter where the system is automatically responsive to the condition of a fluid.

271. Subject matter under subclass 267 automatically responsive to shaft rotation.

SEARCH CLASS:
116, Signals and Indicators, subclass 115 for non-electrical shaft rotation indicators.

272. Subject matter under subclass 213 automatically responsive to the presence or absence of a weight.

SEARCH THIS CLASS, SUBCLASS:
31+, especially 33+, for this subject matter when actuated by vehicle traffic in a roadway.

SEARCH CLASS:
200, Electricity, Circuit Makers and Breakers, subclass 85+ for weight operated switches.

273 Subject matter under subclass 213 automatically responsive to the condition of a permanent barrier member of a structure.

(1) Note. For example, the walls of a building are permanent barriers, but the doors thereof are only temporary barriers.

SEARCH CLASS:
116, Signals and Indicators, subclass 75+ for mechanical burglar alarms.

274. Subject matter under subclass 213 automatically responsive to the condition of a temporary closure.

275. Subject matter under subclass 213 automatically responsive to the closed or open condition of a device.

(1) Note. The system may, for example, be responsive to the open or closed condition of a coupling, such as a trailer hitch

SEARCH THIS CLASS, SUBCLASS:
274, for this subject matter when the device is a temporary closure such as the door, window, lock, etc.

276. Subject matter under subclass 213 for detecting a burglar.

SEARCH CLASS:
116, Signals and Indicators, subclass 75+ for mechanical burglar alarms.

277. Subject matter under subclass 276 automatically responsive to the raising of a person's arm above the level of his head.

278. Subject matter under subclass 213 automatically responsive to the occupancy of a seat.

SEARCH CLASS:
200, Electricity, Circuit Makers and Breakers, subclass 85+ for weight responsive switches.

279. Subject matter under subclass 213 automatically responsive to the condition of a human being or an animal.

(1) Note. This subclass includes, for example, sleep inhibiting alarms which wake a person up every time he has a tendency to drowse.

SEARCH CLASS:
27, Undertaking, subclass 31 for life signals which indicate that a supposedly dead person is alive.
128, Surgery, subclass 2+ for diagnostic instruments.

280. Subject matter under subclass 213 for indicating the placement or removal of an article.

SEARCH THIS CLASS, SUBCLASS:
256, for approach responsive alarms.

281. Subject matter under subclass 280 automatically responsive to the condition of a mail box.

SEARCH CLASS:
232, Deposit and Collection Receptacles, subclasses 34 to 37 for this subject matter, IN ORDER TO COMPLETE THE SEARCH.

282. Subject matter under subclass 213 automatically responsive to the position of a device.

SEARCH CLASS:
116, Signals and Indicators, subclass 124+ for mechanical position indicators.

283. Subject matter under subclass 213 which is portable.

SEARCH THIS CLASS, SUBCLASS:
227+, for portable fire alarms.
276+, for portable burglar alarms.

284. Subject matter under subclass 213 utilizing alternating currents.

285. Subject matter under subclass 213 utilizing a sensor in a Wheatstone bridge.

SEARCH CLASS:
323, Electricity, Voltage Magnitude and Phase Control Systems, subclass 74+ for Wheatstone bridges in general.

286. Subject matter under the class definition relating to systems of transmitters and receivers for signaling.

(1) Note. This is the miscellaneous subclass for systems of signaling and their subcombinations, not elsewhere provided for. Consult the search notes to the class definition for some of the numerous other classes which contain signaling systems.

SEARCH THIS CLASS, SUBCLASS:
345+, for pulse code transmitters, such as are used in signaling systems, subclass 366+ for visual signals (i.e., receivers), subclass 384+ for audible signals and subclass 407 for miscellaneous other signals

287. Subject matter under subclass 286 in which the transmitter is of the signal box type.

(1) Note. The signal box may be of the type which is used in fire alarms, police, district telegraph, messenger box or the like systems. The transmitter usually is a code transmitter.

SEARCH THIS CLASS, SUBCLASS:
215+, for signal box systems which are automatically responsive to a condition.
345+, for pulse code transmitters.

288. Subject matter under subclass 287 combined with some other type of subject matter.

(1) Note. The signaling system, for example, may be combined with an electric light system whose conductors are used as the transmission medium for the signaling system.

SEARCH CLASS:
178, Telegraphy, subclass 49 for telegraph systems combined with other types of electric systems.
179, Telephony, subclass 2+ for telephone systems combined with other types of electric systems.

289. Subject matter under subclass 288 combined with a fire extinguisher.

SEARCH CLASS:
169, Fire-Extinguishers, appropriate subclasses, particularly subclass 23 for combinations of extinguishers as sprinkling systems with mere electric alarms other than code signals of the signal box transmission type.

290. Subject matter under subclass 288 in which the signaling system is combined with means to control apparatus at the fire station.

(1) Note. The system may, for example, automatically open a door at the engine house when the fire alarm rings.

291. Subject matter under subclass 287 having means for repeating signals one or more times or for repeating signals from one line or station to another line or station.

(1) Note. The signal may be repeated, for example, from the call box circuit into several circuits extending to separate fire houses.

SEARCH CLASS:
178, Telegraphy, subclass 70+ for repeaters utilized in telegraphy.

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292. Subject matter under subclass 287 provided with means for maintaining the circuit in operable condition so as to permit sending signals at all times in spite of one or more breaks in the wires and signal box systems provided with means for giving an alarm when an abnormal condition in a circuit, which would prevent normal use, develops.

SEARCH CLASS:
178, Telegraphy, subclass 69 for line clearance and circuit maintenance systems utilized in telegraphy.

293. Subject matter under subclass 287 provided with means at the signal box for transmitting one or more of a variety of signals under the control of the operator.

SEARCH THIS CLASS, SUBCLASS:
348+, for variable code pulse transmitters.

294. Subject matter under subclass 293 provided with a dial selector for selecting the variable signal desired.

295. Subject matter under subclass 287 provided with means for preventing the transmission of signals from any other box or other signals from the same box while any signal is being transmitted therefrom and until such signal is completed.

SEARCH CLASS:
179, Telephony, subclass 30+ for non-interfering party line systems of telephony.

296. Subject matter under subclass 295 provided with means to obstruct the entrance of the key which is used to operate the signal box, said means operating to prevent insertion of the key only during the transmission of a signal sequence.

297. Subject matter under subclass 287 provided with means to exhibit indications at the signal box from which the signals are transmitted, so that said box also acts as a receiver.

(1) Note. The signal box, when operated, for example, may produce a preliminary signal of the audible type at the box to discourage would-be pranksters from turning in a false alarm.

298. Subject matter under subclass 297 having means to send an answer-back signal to notify the operator that the transmitted signal has been received.

299. Subject matter under subclass 297 in which the signal at the box is operated simultaneously by the transmitted signal.

300. Subject matter under subclass 297 in which the signal at the box is a lamp.

(1) Note. The lamp may, for example, be used to notify a policeman on his beat to call in.

301. Subject matter under subclass 287 in which the signal box is actuated by a movable key.

(1) Note. The key may, for example, be attached to the box by means of a chain, or the key may be in the custody of the person who turns in the alarm, who must surrender the key to the box mechanism before he can turn the alarm in, so that his identity may be made known.

302. Subject matter under subclass 301 in which the key is normally housed by a frangible closure, which must be broken in order to obtain the key for operation of the box.

303. Subject matter under subclass 287 provided with a frangible closure which must be broken in order to send a signal.

SEARCH THIS CLASS, SUBCLASS:
302, for this subject matter where the frangible closure encloses a movable key, which key is used to transmit the signal.

304. Subject matter under subclass 287 provided with means for combating false alarms.

(1) Note. The signal box may, for example, be provided with means for detaining, as by handcuffing means, the person who sends in an alarm.

SEARCH THIS CLASS, SUBCLASS:
301, for signal box systems where the person turning in the alarm must surrender an individual key to the signal box mechanism before he can send the alarm.

305. Subject matter under subclass 287 in which the signal box is actuated by a local circuit separate from the main circuit.

306. Subject matter under subclass 305 in which the signal box is provided with a local circuit for use by watchmen.

307. Subject matter under subclass 287 consisting of a transmitter utilized in signal box systems.

SEARCH THIS CLASS, SUBCLASS:
345+, for pulse code transmitters per se.

308. Subject matter under subclass 307 in which the signal is sent automatically when the door of the signal box is opened.

309. Subject matter under subclass 307 having a rotary make and break wheel.

SEARCH THIS CLASS, SUBCLASS:
345+, for pulse code transmitters of general utility having rotary make and break wheels.

309.1 Subject matter under subclass 286 in which the system includes means whereby the communication is brought about after a predetermined time lapse or is continued for a predetermined time following initiation.

SEARCH CLASS:
58, Horology, subclass 19+ for a mechanical clock with an electric alarm and subclass 38+ for an electric alarm clock.

309.2 Subject matter under subclass 309.1 combined with means other than partially or wholly electrical means for conveying information or intelligence.

309.3 Subject matter under subclass 309.1 including an additional means, not under the control of the timer, for conveying information or intelligence.

309.4 Subject matter under subclass 309.1 including a plurality of indicators selectively or sequentially controlled by the timer.

309.5 Subject matter under subclass 309.4 including a manually actuated means which has no utility in the operation involving the timer but may be utilized for controlling one or more of the indicators independently of the timer.

309.6 Subject matter under subclass 309.1 in which the communication system includes two circuit maker-breakers in series, both of which must be closed in order for the information or intelligence to be transmitted, and both of the circuit maker-breakers being under the control of the timer.

310. Subject matter under subclass 286 combined with some other type of subject matter.

(1) Note. The system may, for example, be combined with an electric light system over whose conductors the signals are sent.

SEARCH THIS CLASS, SUBCLASS:
216 and 220+, for this subject matter where the system is automatically responsive to a condition.
238+, for this subject matter where the signal system is a signal box system.
320, for signaling systems in which the electric signal is sent along a fluid conduit.

SEARCH CLASS:
179, Telephony, subclass 2+ for telephone systems combined with other types of systems.

311. Subject matter under subclass 286 for paging an individual.

312. Subject matter under subclass 311 having means for reporting the location of said individual back to the point where the paging originated.

SEARCH THIS CLASS, SUBCLASS:
313, for other types of answer back systems.

313. Subject matter under subclass 286 having means to send an interrogation from one station to another and having means to send the answer to said interrogation back from said second station to said first station.

SEARCH THIS CLASS, SUBCLASS:
152, for selective systems for automatically and selectively answering interrogations.

314. Subject matter under subclass 313 having means to sound an alarm if the answer to the interrogation is improper.

315. Subject matter under subclass 286 having selsyn type transmitters and receivers.

SEARCH THIS CLASS, SUBCLASS:
198, for this subject matter in telmetering systems.

SEARCH CLASS:
318, Electricity, Motive Power Systems, subclass 690+, for self-synchronous electric motor systems.

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316. Subject matter under subclass 286 in which the receiver is provided with means which are unbalanced by the transmitted signal and is provided with means for rebalancing said means.

SEARCH CLASS:
318, Electricity, Motive Power Systems, subclass 638+ for electric motor systems controlled by a self-balancing network.

317. Subject matter under subclass 316 in which the unbalanced means at the receiver is automatically rebalanced.

SEARCH THIS CLASS, SUBCLASS:
187, for similar subject matter utilized in telemetering systems.

318. Subject matter under subclass 286 having synchronous distributers at both the transmitter and receiver.

SEARCH THIS CLASS, SUBCLASS:
183, for similar subject matter utilized in telemetering systems.

SEARCH CLASS:
178, Telegraphy, subclass 52+ for similar subject matter utilized in telegraph systems.

319. Subject matter under subclass 286 in which the receiver has plural electromagnets or plural motors.

SEARCH THIS CLASS, SUBCLASS:
176+, for similar subject matter utilized in telemetering systems.

320. Subject matter under subclass 286 in which the electric signal is transmitted along a fluid conduit.

(1) Note. The fluid conduit may, for example, be a fire hose, so that the firemen may be able to communicate back from the nozzle to the engine pumper.

SEARCH CLASS:
174, Electricity, Conductors and Insulators, subclasses 8+ and 47 for fluid conduits combined with electrical conductors.

321. Subject matter under subclass 286 which is portable and self-contained.

(1) Note. This subclass includes, for example, movie ushers' flashlights which have means for signaling.

SEARCH CLASS:
240, Illumination, subclass 10.5+ for battery flashlights of general utility.

322. Subject matter under subclass 286 in which the system has means to cancel any indications after a fixed time.

323. Subject matter under subclass 286 for reporting the status of a game.

SEARCH CLASS:
116, Signals and Indicators, subclass 120 for mechanical game reporting devices.
273, Amusement Devices, Games, appropriate subclasses for games in combination with game reporting devices.

324. Subject matter under subclass 286 in which the receiver has more than two possible indications.

(1) Note. Instead of having an on-off variation, the indicators in this subclass have a greater number of variations, such as, for example, "safe", "caution" and "danger".

325. Subject matter under subclass 324 in which the indication is varied in step-by-step fashion.

326. Subject matter under subclass 286 in which a single variation indication is given at plural points or in plural manners.

(1) Note. The indication may, for example, be given by an electric light signal and also by an electric bell signal, so that the bell rings when the light flashes.

327. Subject matter under subclass 326 provided with means to cut off a sound signal.

(1) Note. The sound signal, for example, may be cut off while the light signal continues to flash, or one sound signal may be cut off while the second one continues to sound.

328. Subject matter under subclass 286 having an audible signal.

SEARCH THIS CLASS, SUBCLASS:
384+, for audible signals per se.

329. Subject matter under subclass 328 in which the audible signal operates intermittently.

330. Subject matter under subclass 286 for signaling whether a person is "in" or "out".

(1) Note. A door bell button may, for example, cause an "out" sign to flash instead of causing the bell to ring.

331. Subject matter under subclass 286 having a periodic or flashing signal.

SEARCH THIS CLASS, SUBCLASS:
329, for this subject matter where the signal indicator is audible.

332. Subject matter under subclass 286 having signal lights.

333. Subject matter under subclass 286 having significantly recited or significant power supply systems.

(1) Note. The system, for example, may be provided with means to substitute an auxiliary source of power if the regular source fails.

SEARCH CLASS:
307, Electrical Transmission or Interconnection Systems, subclass 64+ for emergency power systems of general application.

334. Subject matter under subclass 286 for use as advertising displays.

SEARCH CLASS:
40, Card, Picture and Sign Exhibiting, subclass 130+ for similar subject matter not having significant electric light system.
315, Electric Lamp and Discharge Devices, Systems, appropriate subclasses, for electric light systems of general application, which can be utilized either for electric light displays or for other purposes.

335. Subject matter under subclass 334 having means to vary the intensity of the light.

SEARCH CLASS:
315, Electric Lamp and Discharge Devices, Systems, subclass 291+ for systems for controlling the current to electric lights or lamps.

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336. Subject matter under subclass 334 in which different electric light circuits control the illumination of different character fragments and in which the complete character is obtained by proper illumination of selected character fragments.

SEARCH THIS CLASS, SUBCLASS:
103, for analogous subject matter in vehicle lights.
147+, for this subject matter wherein the lighting of the different character fragments is controlled by a selective system having fewer input control circuits than output controlled circuits.

SEARCH CLASS:
178, Telegraphy, subclass 30 for character fragment telegraph systems.

337. Subject matter under subclass 334 having keyboard means to control the indications.

(1) Note. The keyboard, for example, may be of the type wherein a writing stylus depresses switch buttons as it is moved.

SEARCH CLASS:
315, Electric Lamp and Discharge Devices, Systems, subclass 292 for keyboard operated electric light systems.

338. Subject matter under subclass 334 having cam control switch means to control the indications.

SEARCH CLASS:
200, Electricity, Circuit Makers and Breakers, subclass 19+ for periodic switches.
315, Electric Lamp and Discharge Devices, Systems, subclass 209+ for periodic electric light systems.

339. Subject matter under subclass 334 having a pattern control switch to control the indications.

SEARCH CLASS:
200, Electricity, Circuit Makers and Breakers, subclass 46 for pattern control switches.
315, Electric Lamp and Discharge Devices, Systems, subclass 293 for pattern control electric light switching systems.

340. Subject matter under subclass 334 having means to cause a flashing of the electric lights.

341. Subject matter under subclass 340 having plural circuits which are flashed.

342. Subject matter under subclass 340 having a thermal switch type flasher in the flashing circuit.

SEARCH CLASS:
337, Electricity, Electrothermally or Thermally Actuated Switches, subclasses 51, 92, 116, 138, 302 and 369 for particular types of thermal switches adapted for flashing circuits.

343. Subject matter under subclass 334 having a space discharge tube.

(1) Note. The well-known neon sign contains a space discharge tube.

SEARCH CLASS:
313, Electric Lamp and Discharge Devices, subclasses 106+, 109.5 and 182+ for the structure of space discharge tubes.
315, Electric Lamp and Discharge Devices, Systems, appropriate subclasses for space discharge tube circuits of general application.

344. Subject matter under subclass 343 having a space discharge tube of the negative glow type.

345. Subject matter under the class definition for transmitting coded sets of pulses.

SEARCH THIS CLASS, SUBCLASS:
147+, for this subject matter in combination with pulse responsive selective devices.
307, for pulse code transmitters used in signal box systems.

SEARCH CLASS:
178, Telegraphy, subclasses 17+ and 79+ for this subject matter, when disclosed in combination with a telegraph system, IN ORDER TO COMPLETE THE SEARCH.
179, Telephony, subclass 84+ for this subject matter when disclosed in combination with a telephone system, IN ORDER TO COMPLETE THE SEARCH.
234, Selective Cutting (e.g., Punching), subclass 94+, for combinational-coding means in a selective cutting device.

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346. Subject matter under subclass 345 having plural code transmitters.

(1) Note. The plural transmitters, for example, may be arranged so as not to interfere with each other.

SEARCH THIS CLASS, SUBCLASS:
295, for non-interfering signal box systems.

347. Subject matter under the class definition having means to translate one code into another.

(1) Note. The transmitter, for example, may receive its information in the form of a decimal code and transmit the information in the form of a binary code.

SEARCH THIS CLASS, SUBCLASS:
147+, for selective systems having code translation. Note especially indented subclass 167+.

SEARCH CLASS:
35, Education, subclass 2+, especially subclass 4, for electrically operated cryptographic devices for determining a code or for decoding a message. See the search notes under subclass 2 as to other classes having devices utilizing cryptographic means.

178, Telegraphy, subclass 5.1 for facsimile systems, and subclass 22 for telegraph systems in general employing code translation means for privacy or secrecy.
179, Telephony, subclass 1.5 for telephone systems having code translation for insuring privacy or secrecy.
234, Selective Cutting (e.g., Punching), subclass 69+, for a pattern-controlled selective punching device embodying code conversion means.

315, Electric Lamp and Discharge Devices, Systems, subclass 8.5+ for cathode ray tube systems for converting electrical input pulses conforming to one code to output pulses conforming to a different code (e.g., decimal to binary or vice versa).

317, Electricity, subclass 134 for electrical relay systems of the code responsive or secrecy type.
325, Modulated Carrier Wave Communication Systems, subclass 32+ for radio systems with means to insure privacy or secrecy in transmission.
329, Demodulators and Detectors, subclass 104+, for pulse demodulators or detectors.
332, Modulators, subclass 1 for modulation converters (e.g., pulse to F.M., F.M. to A.M.).
343, Communications, Radio Wave, subclass 200+ for privacy insuring radio wave energy systems wherein the marking or coding signal may be a separate message.

348. Subject matter under subclass 345 for transmitting permutation type pulses and for varying said permutations.

SEARCH THIS CLASS, SUBCLASS:
204, for telemetering systems utilizing permutation pulses.

349. Subject matter under subclass 348 in which plural types of pulses are utilized.

(1) Note. The pulses may vary, for example, in their widths, polarity, length or the frequency of their carrier.

350. Subject matter under subclass 348 having plural channels leading away from the transmitter.

(1) Note. There may be an individual channel, for example, for each individual pulse of the code.

SEARCH CLASS:
178, Telegraphy, subclass 31+ for multiple line telegraph systems.

351. Subject matter under subclass 348 in which the frequency of the carrier upon which the pulses are modulated is varied.

352. Subject matter under subclass 348 in which the polarity of the pulses is varied.

353. Subject matter under subclass 348 in which the length of the pulses is varied.

354. Subject matter under subclass 348 in which the code consists of a set and fixed number of pulses and in which the permutation consists of the presence or absence of a pulse.

(1) Note. The well-known Baudot code is an example of the permutation codes in this subclass.

355. Subject matter under subclass 348 in which the amplitude of the pulses is varied.

356. Subject matter under subclass 345 in which the code is repeated.

(1) Note. The repetition may go on continuously until stopped at will or it may occur for a set number of times.

357. Subject matter under subclass 345 having plural code wheels on one shaft.

SEARCH CLASS:
178, Telegraphy, subclass 84 for drum type code transmitters utilizing telegraphy, IN ORDER TO COMPLETE THE SEARCH.

358. Subject matter under subclass 357 in which the plural code wheels are interchangeable.

359. Subject matter under subclass 345 in which all the pulses are of the same type and the meaning of the pulse code is determined solely by the number of pulses transmitted.

(1) Note. The type of code found in this subclass is known in the art as the numerical pulse type.

360. Subject matter under subclass 359 for transmitting a plural digit number by sequences of numerical pulses whose overall sum is always constant.

(1) Note. For example, a two digit number may be transmitted by three pulse groups, the first two being numerical and designating the number, while the third being added to bring the overall sum to the desired constant fixed value.

361. Subject matter under subclass 359 having pulse counter which is common to several digi

SEARCH CLASS:
307, Electrical Transmission or Interconnec tion Systems, subclass 220+ for transisto or non-linear conductor devices forming electrical pulse counting circuits or chain and not elsewhere classifiable.
315, Electric Lamp and Discharge Devices, Systems, subclass 8.5+ for cathode ray tu systems forming electrical pulse counting circuits, and subclass 84.5+ for similar trical pulse counting circuits utilizing gas space discharge devices.

362. Subject matter under subclass 361 having a r lay chain counter.

SEARCH THIS CLASS, SUBCLASS:
168, for counting relay chains of general utili

363. Subject matter under subclass 361 having a ro tary counter.

364. Subject matter under subclass 345 having a ro tary distributor.

SEARCH CLASS:
178, Telegraphy, appropriate subclasses, fo telegraph systems utilizing rotary distrib utors. Note particularly indented subclas 52+ for multiplex systems using rotary dis tributors.

365. Subject matter under subclass 345 having de sired code selecting devices.

(1) Note. The desired code selecting device ma be, for example, a keyboard or a plugboard.

366. Subject matter under the class definition fo giving visual indications.

SEARCH CLASS:
116, Signals and Indicators, subclass 114+ fo mechanical indicators.
240, Illumination, appropriate subclasses, fo electric lights and associated apparatu Note particularly subclass 22+ for sign lanterns.

371. Subject matter under subclass 366 for giving concomitant plural indications.

(1) Note. The indications may be for example, the ringing of a bell with the concomitant flashing of a light.

372. Subject matter under subclass 366 having plural visual signals.

(1) Note. For example, plural drop annunciators may be grouped together and have a common restorer.

373. Subject matter under subclass 366 having means which visually move for giving the indication.

375. Subject matter under subclass 373 having means to close a circuit when the visual indicator moves.

376. Subject matter under subclass 373 in which the visually moving means is released by an electromagnetically released latch.

377. Subject matter under subclass 366 having means to cause cancellation of the indication after a fixed period of time.

SEARCH THIS CLASS, SUBCLASS:
322, for this subject matter in combination with a system.

378. Subject matter under subclass 366 having means for exhibiting more than two indications.

(1) Note. The indications may, for example, be "safe", "warning" and "danger".

SEARCH THIS CLASS, SUBCLASS:
324, for this subject matter in combination with a system.

379. Subject matter under subclass 378 having step-by-step means for giving the indication.

SEARCH THIS CLASS, SUBCLASS:
325, for this subject matter in combination with a system.

380. Subject matter under subclass 366 having liquid or solid optical means for guiding light beam within said means.

(1) Note. This subclass contains, for example, light signals having "Lucite" piping.

SEARCH CLASS:
250, Radiant Energy, subclass 227 for light piping in combination with photo cells.

350, Optics, Systems and Elements, subclass 96 for light piping, per se.

381. Subject matter under subclass 366 for use in switchboards and panels.

382. Subject matter under subclass 366 having means to prevent false signal indications.

(1) Note. A light signal, for example, may be provided with means to prevent the glass lens from glowing like a cat's-eye when the sun is low in the horizon and behind the observer.

383. Subject matter under subclass 366 having signal lenses or consisting of signal lenses.

SEARCH CLASS:
240, Illumination, appropriate subclasses, for illuminating lenses. Note particularly subclass 106+.

350, Optics, Systems and Elements, subclass 175+ for lenses, per se.

384. Subject matter under the class definition for producing audible sounds as signaling indications.

(1) Note. The audible signaling means, for example, may produce sound which simulates the nose in an airplane, for use in training programs.

SEARCH THIS CLASS, SUBCLASS:
8+, for similar subject matter used under water for underwater signaling.

385. Subject matter under subclass 384 having means to explode an explosive.

SEARCH CLASS:
102, Ammunition and Explosive Devices, appropriate subclasses, for explosive devices in general.

386. Subject matter under subclass 385 for producing plural explosions in succession.

387. Subject matter under subclass 384 provided with weatherproofing means.

(1) Note. The device may, for example, be provided with means to melt sleet off the device.

388. Subject matter under subclass 384 having a diaphragm.

389. Subject matter under subclass 388 in which the diaphragm is moved back and forth by means of a curved cam.

SEARCH CLASS:
274, Sound Recording and Reproducing, appropriate subclasses, for phonographs, IN ORDER TO COMPLETE THE SEARCH FOR THIS SUBJECT MATTER.

390. Subject matter under subclass 388 having a rotary actuator to actuate the diaphragm.

391. Subject matter under subclass 388 provided with supports for the diaphragm or for the sound producer.

392. Subject matter under subclass 384 having means to hit one element against another in order to produce the audible sound.

SEARCH THIS CLASS, SUBCLASS:
388+, for this subject matter in which one of the elements is a diaphragm.

SEARCH CLASS:
84, Music, subclasses 402+ and 411+ for similar subject matter utilized in music.

393. Subject matter under subclass 392 combined with the same subject matter or with some other subject matter.

(1) Note. A manual and an electric bell, for example, may be combined in a unitary structure.

394. Subject matter under subclass 393 having a unitary battery.

SEARCH CLASS:
240, Illumination, subclass 10.5+ for flash lights having unitary batteries.

395. Subject matter under subclass 392 which is suspended.

(1) Note. The percussion type sound producer, for example, may be a locomotive bell which is swung in gimbals.

396. Subject matter under subclass 392 in the form of a gong or bell which encases its striking mechanism.

397. Subject matter under subclass 392 having means which are polarized with respect to the electric currents.

398. Subject matter under subclass 392 having a linkage between the operator and the clapper.

(1) Note. This subclass includes, for example, the familiar church bell when operated via a linkage from an electric motor.

399. Subject matter under subclass 392 having a rotary clapper.

400. Subject matter under subclass 392 for giving a single stroke for every single impulse of electric current.

401. Subject matter under subclass 400 for use with alternating currents.

402. Subject matter under subclass 392 relating to the subcombinations thereof.

(1) Note. This subclass includes, for example, clappers.

403. Subject matter under subclass 402 relating to the details of the interrupter.

404. Subject matter under subclass 384 having means to produce an audible sound by pneumatic power.

(1) Note. This subclass includes, for example, horns having electromagnetic valves to control the flow of air.

SEARCH CLASS:
137, Fluid Handling, subclass 719+ for electrically control valves.

405. Subject matter under subclass 404 having a siren.

406. Subject matter under subclass 404 having a whistle.

407. Miscellaneous subject matter under the class definition not provided for above.

(1) Note. This subclass includes, for example, tactual signals and odoriferous signals.

408. Subject matter under subclass 213 wherein a central station sends an interrogation signal to a remote station which in turn responds with a signal indicative of the conditions at the remote station.

(1) Note. The response signal may be indicative of the original interrogating signal and any intervening disturbances. However, the condition is indicated only in response to the interrogation. See subclass 213.1+ for acknowledgement systems, and (1) Note thereunder for the distinction between interrogation and acknowledgement systems.

SEARCH THIS CLASS, SUBCLASS:
213.1+, for acknowledgement systems.
226, for answerback systems.

SEARCH CLASS:
343, Communications, Radio Wave, subclass 6.5+ for interrogation-responder systems operating over radio waves.

409. Subject matter under subclass 213 including means exercising surveillance of the monitoring circuit for proper operativeness such as fail-safe.

(1) Note. Supervision should be distinguished from automatic testing of the monitoring circuit as in subclass 411 below in that supervision implies continuous surveillance of the monitoring circuit while automatic testing is periodic.

SEARCH THIS CLASS, SUBCLASS:
248+, for systems responsive to a condition such as failure of electrical apparatus generally.
411, for automatically periodic testing. See also (1) Note above.

410. Subject matter under subclass 214 wherein the test is performed by simulating the condition.

SEARCH THIS CLASS, SUBCLASS:
225, for simulation or mimic type indicators.

411. Subject matter under subclass 214 wherein the test is performed automatically, as at spaced intervals.

SEARCH THIS CLASS, SUBCLASS:
409, for condition responsive systems with supervision. See also (1) Note thereunder for the distinction between supervision and automatic testing.

412. Subject matter under subclass 213 wherein a plurality of conditions are being monitored, but only one is selected for indication.

SEARCH THIS CLASS, SUBCLASS:
147+, for selective communication systems.

SEARCH CLASS:
307, Electrical Transmission or Interconnection Systems, subclass 116+, for condition responsive electrical switching systems.

413. Subject matter under subclass 412 wherein the conditions are successively monitored.

SEARCH THIS CLASS, SUBCLASS:
150, for selective communication systems with telemetering.
183, for continuously variable indicating systems with plural transmitters periodically connected to the line in sequence.

SEARCH CLASS:
324, Electricity, Measuring and Testing, for plural electrical tests generally.

414. Subject matter under subclass 412 wherein the monitor selects for indication the worst of a plurality of conditions.

(1) Note. Examples of the worst conditions are the greatest unbalance, the greatest difference from a standard, or the most extreme variation in a given direction.

A830

415. Subject matter under subclass 412 wherein the monitor circuit selects for indication the first of a plurality of conditions to become abnormal.

416. Subject matter under subclass 213 wherein the automatically responsive system is combined with or includes a particular or significant communication link for transmitting the alarm signal.

(1) Note: To complete the search for this subject matter, the search should extend into the appropriate fields of classification of the particular communication link, such as Class 178, for telegraphy, Class 179, for telephony, and Class 343, for radio wave communications.

SEARCH THIS CLASS, SUBCLASS:
189+, for continuously variable indication via a radiant energy beam.

417. Subject matter under subclass 222 wherein a thermal state or condition such as temperature is controlled.

(1) Note: This subclass includes, for example, controlling a heater for a de-icer, toaster, sad iron, or furnace; or it may include control of a refrigeration cycle.

SEARCH CLASS:
62, Refrigeration, subclass 132+ for automatic control of refrigeration.
219, Electric Heating, subclass 509+, for electrical heating devices generally with automatic operation.
236, Automatic Temperature and Humidity Regulation, for control of temperature regulating devices.

418. Subject matter under subclass 222 wherein the control operates a fire extinguisher or other fire safety device.

SEARCH CLASS:
169, Fire-Extinguishers, for extinguishers, per se.
182, Fire Escapes, Ladders, Scaffolds, for fire escapes, per se.

419. Subject matter under subclass 222 wherein the control cuts off a motor or supply to cause a complete shut down in the system.

(1) Note: The motor and supply are usually electrical, although the subclass does provide for some fluid such as fuel supplies.

SEARCH CLASS:
431. Combustion, subclass 77+ for a burner that is shutdown responsive to sensed flame failure or overheat.

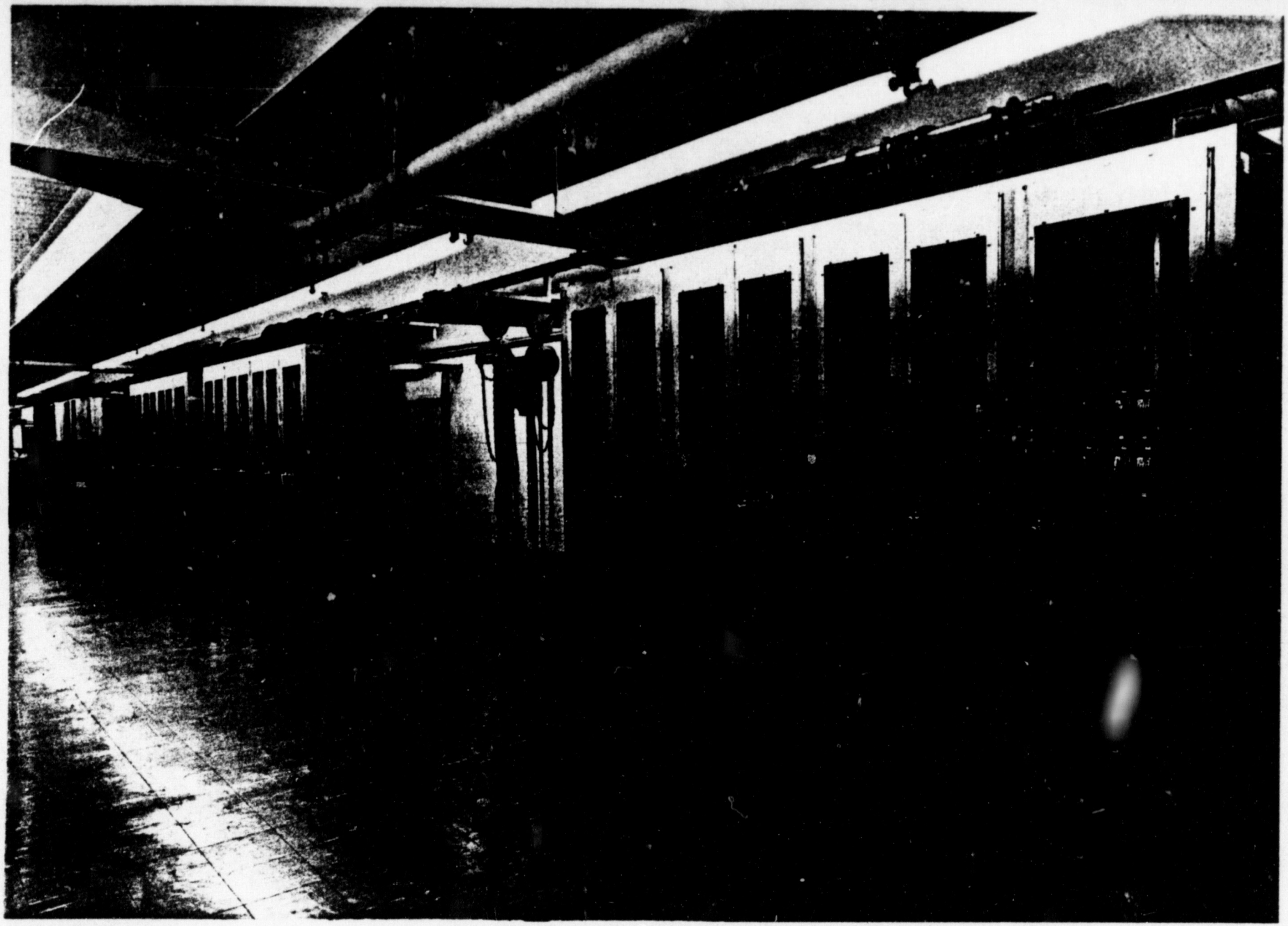
420. Subject matter under subclass 213 responsive to at least two diverse conditions, such as smoke and heat or pressure and water level.

SEARCH THIS CLASS, SUBCLASS:
220+, for systems automatically responsive to a condition together with a diverse art device.

421. Subject matter under subclass 213 wherein the system includes a sensor itself adapted or adapting the system to respond to a particular condition or group of conditions thus giving the system a special application.

(1) Note: In the generic subclass 213 patents are classified which are not indicated as responsive to a particular condition, as by emphasis on the indication circuit with no sensing structure disclosed or with no particular designation of the application of the sensing structure.

SEARCH CLASS:
200, Electricity, Circuit Makers and Breakers, subclass 52+, for electrical switches of special application.



DEFENDANT'S
EXHIBIT
A

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DEFENDANT'S
EXHIBIT
B

DEFENDANT'S EXHIBIT C NO. 67C 1119

AMERICAN TOTALISATOR COMPANY
DIVISION OF UNIVERSAL CONTROLS, INC.
383 HILLEN ROAD
TOWSON 4, MD.

O. C. LEVY, VICE PRESIDENT
N. C. POGUE JR., VICE PRESIDENT

NEW YORK OFFICE
745 FIFTH AVE.

CABLE ADDRESS
"AMTOTAL" BALTIMORE NEW YORK

May 29, 1961

EXHIBIT NO.

Mr. Alvin L. Weil, President
Roosevelt Raceway, Incorporated
Westbury, Long Island, New York

Dear Al:

The American Totalisator Company has developed an Automatic Pay-Off Price Computer for use in the mutuel department. This unit is now in its third year of operation at Aqueduct Race Track. In the meantime, intensive research has been continued to produce a computer which would be more compact and provide greater portability. Our engineers have now completed and field-tested a new computer which embodies the most recent advances in the computer field, using solid state electronics, for greater speed, accuracy and simplicity of operation.

At the close of wagering, the totals accumulated in the totalizing units on all entries in the three pools are automatically transmitted to the computer. The amount wagered on each entry is printed on the summary sheet and the pool additions proved; the commission is deducted to produce the net pool figures; these entries are stored in the computer memory. When the order of finish is official, the computer proceeds quickly through the necessary calculations and types out the pay-offs on $2.00, $5.00, $10.00, $50.00, $100.00 and combination tickets. A proof of each pool, showing the "breakage" and commission, is provided to complete the audit (see the enclosed sample). The completed summary showing the pay-off extensions is now available to the Mutuel Manager sooner than the manual operation can make the same information available.

The computer is compact, being the size of a small office desk, and no installation expense is involved in connecting it to the totalizing units. The service charge for the new computer is One Hundred Ten ($110.00) Dollars per day.

This is not a commercial-type computer being adapted for the mutuel department but is a specially engineered and designed computer to automatically receive the pool totals and calculate the pay-off prices. By the pressing of a key, any one of twenty-eight combinations of order of finish is calculated in seconds. This new price computer brings automation to the Calculating Room and results in a

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very definite saving in the payroll of that department. The number of calculators is reduced to a skeleton force required for the miscellaneous paper work in the department and to verify the computer prices. The introduction of this price computer by the American Totalisator Company is a "major breakthrough" in bringing complete Totalisator service to the tracks.

Knowing that your Association has always been a leader in bringing its patrons the best in comfort and service, we feel sure that you will wish to advance that service by using this new price computer. As these computer units are expensive and require several months to build and test, we will appreciate hearing from your Association at an early date so that we can anticipate our requirements for next year. If you wish to have this new service, starting in 1962, please sign and return to us the two original copies of the enclosed Rider, which would become part of your present Totalisator Service Agreement. One copy will be returned to you after being signed by our officials. The carbon copy is for your files.

If you desire further information regarding this new service, please feel free to call upon us.

Sincerely yours,

AMERICAN TOTALISATOR COMPANY
Division of Universal Controls, Inc.

Raymond C. Hardin

Raymond C. Hardin

RCH/hp
Encs.

DEFENDANT'S EXHIBIT
F GV
NO. 6TC 1119

A835

May 11, 1959

ROOSEVELT RACEWAYS
Westbury, Long Island,
New York.

The following preliminary proposal to Roosevelt Raceways offers the basic details of a system to be owned and operated by the track or by an association of tracks. The prices presented are intended for guidance and serve as indications of the cost of the electronic and mechanical equipment involved. It is understood that a detailed and acceptable price formulation will be part of any contract written.

For one central data accumulating, computing, printout and display system capable of handling regular as well as daily double operations $405,000

For 300 regular plus 150 daily double machines $450,000

For each month of maintenance as per Section 9 .....$ 12,000

If the quantities involved above are increased as a result of multiple installations, the individual system prices will decrease.

It is estimated that design, construction and installation would require approximately one year.

Signed Eugene Leonard
Eugene Leonard - Vice President
Dictronics Corp.

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TO
ROOSEVELT RACEWAY

A836.

BETTING - DATA COMPUTATION SYSTEM

1. FUNCTION OF THE EQUIPMENT

1.1 One function of the equipment specified herein is to dispense ticket with certain permanent and variable printed information for each of nine races. Other units are to dispense tickets with similar information required for the Daily Double.

1.2 A second function of the equipment is to continuously gather data fr each of up to 300 windows for each of the nine races and from each o up to 150 windows for the Daily Double. By means of a small plugbo any of the windows can be assigned to receive win, place or show bet in any amount.

1.3 A third function of the equipment is to perform the following computations:

(a) Totals bet on each of up to twelve horses for win, place, sho

(b) The net distribution (i.e. 85% of the total bet) for each win place and show.

(c) The tentative win odds for each of twelve horses calculated i accordance with the odds list normally used.

(d) Pay-off for win, place or show at end of each race.

(e) Totals bet at each window for each race.

(f) Daily Double net distribution.

(g) Pay-off for each possible combination of first race winner wi second race horses, rounded to nearest ten cents.

(h) Modifies pool data and odds in the event of scratches.

(i) Can accommodate dead heats of up to three horses.

1.4 A fourth function of the equipment is to provide the following for dis play on the tote board:

(a) Every seventy seconds the information in 1.3 (a), (b), (c) and (f).

(b) At the end of each race within five seconds of the rendering o the judges' decision, the exact payoff.

(c) At the end of the first race the possible Daily Double payoffs.

1.5 A fifth function of the equipment is to display at the central monitor station all the information of section 1.3.

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2.- TICKET DISPENSERS

✓ The ticket dispensers will be able to print the required information on tickets, feed corresponding signals into the system and can be locked by a remote signal.

MORE DETAIL ✓ The dispenser will be loaded with ticket rolls which include the amount of the bet; whether win, place or show. The dispenser will print the date.

In addition, for each race it will print the race number and the special code for that race. For each transaction the dispenser will also print the number of the horse.

✓ An interlock is provided which prevents any type of operation which could lead to errone , or multiple reporting of an operation to the system.

✓ Each ticket dispenser will have a counter to total the number of transactions. This cumulative total will be checked against the central Data Collection System.

3. THE DATA COLLECTION SYSTEM

3.1 Signalling by Ticket Dispensers

✓ All ticket dispensers are interrogated sequentially during a period of about one tenth . a second and the "scanning cycle" or interrogation of all machines is repeated continually, so that any given machine is interrogated ten times per second.

✓ As long as no ticket sale occurs, every interrogation results in a "standby" response. This is a safety check since the absence of a response would indicate malfunction.

✓ As soon as a ticket sale occurs a "transaction" signal replaces the "standby" signal and indicates the number of the horse on which the bet is placed. This information is registered in the system memory.

3.2 Wiring to Ticket Dispensers

✓ Each ticket dispenser is connected to the central data collection system and carries the information from each machine. Each dispenser responds to interrogation in its turn. As a "fail-safe" feature a signal to the ticket machine is required to unlock rather than to lock the dispenser. Thus, if the connection for any reason, is damaged or its signal is faulty, the result is to prevent operation of the corresponding dispenser.

3.3 Data Accumulator - The Central Unit of the Data Collection System

Four principal units make up the data accumulator - they are the scanner, the plugboard, the interpreter and the memory. These are interconnected by appropriate miscellaneous circuitry.

3.3.1 Scanner

The Scanner functions by continuously sending out, in sequence, the various code combinations which serve to interrogate dispensers. The information is thus identified as coming from a particular dispenser.

The Scanner runs through its complete cycle of all dispensers in one-tenth second.

3.3.2 The Plugboard

The plugboard permits any of the 300 possible regular windows to be assigned to receive win, place or show bets in any amount. Likewise it permits assigning any one of the amount to be assigned to each of the 150 Daily Double windows. The windows can be set up in any desired pattern to handle their betting load in the manner found to be most efficient and the pattern can be changed at will.

3.3.3 The Interpreter

The interpreter has two functions:

(a) to store appropriate data in the memory in accordance with signals received from the response wires and the plugboard.
(b) to indicate any failure of these signals to conform to certain rigid criteria indicating correct operation.

3.3.3.1 - Control of Memory - A particular signal from the response wires to the Interpreter indicates that no ticket has been sold at the window being scanned. Another signal would indicate that the dispenser being scanned is locked, either because it has not completed its cycle on a ticket sale or because betting is closed for the race. In each case no information is fed by the Interpreter to the Memory.

Another signal means that a ticket has been sold on a specific horse and the combination of signals from the response wires indicates which of the twelve horses is involved. In this case the interpreter will cause the bet to be stored in the Memory and will use the information simultaneously received from the plugboard to determine the size of the bet and if it is for win, place or show.

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Having caused the bet to be registered in the Memory the Interpreter will send an "unlock" signal to the window involved. If for any reason the Interpreter does not send the "unlock" signal immediately following the scan cycle, the machine will lockup. The "unlock" signal indicates registration of a bet and is also sent back by the Interpreter after each "standby" signal is received as an added checking feature.

3.3.3.2 - Checking by the Interpreter - The Interpreter makes several types of tests to provide very careful safeguards against malfunction. The circuits are so arranged that a break in any wire or a malfunction at any time is immediately detected. The Interpreter localizes the malfunction so that a visual indication is made of the window involved. No "unlock" signal is returned to that particular window which then cannot operate until correction is made.

3.3.4 The Memory

The function of the Memory is to store various information required for computations and printout or visual display.

3.3.4.1 - One section of the memory stores 36 totals of 6 digits each representing the totals bet on each of twelve horses for win, place or show and (three additional totals representing the net win, place and show distribution.) The latter represents 85% of the total dollar amounts bet on all horses for win, place and show respectively.

For extreme reliability adding circuits are duplicated and continuously compared. Additional checks are provided when data is read out of memory for printout or other forms of display. If one computing section is faulty, the other section can be made to perform each computation twice until repairs are made.

3.3.4.2 - A second section of the memory stores the totals for each window. The same dollar figures used to add into the individual horse totals are added into the window totals. Similar check circuits are provided. At the time the windows are closed, just prior to post time, a list of window totals is automatically printed out.

3.3.4.3 - A third section of the memory provides storage of data required for Daily Double computations.

4. THE COMPUTER

Two types of computation are performed by the computer. Every time the windows are scanned (ten times a second) the odds are computed and stored for posting at frequent intervals. At the end of the race, when the Judges' decision has been announced, the payoff is computed and is available for posting within five seconds.

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The Computer Memory stores a maximum of eleven payoff results as well as other constants required for determining the odds. Each quantity has a maximum of six decimal digits.

5. DISPLAY

Display of amounts bet on each horse for win, place and show, the total win, place and show pools and the odds will be provided on the existing boards. (Daily Double display is described in Section 6).

The information required for display is kept up-to-date by substituting current values for old values at intervals of about seventy seconds.

A local display panel will be provided for monitoring the data before it is fed to the main display board. The latter operation can only occur after an operator manually releases an interlock.

At the end of each race the payoffs will be displayed as soon as they have been computed and monitored.

6. THE DAILY DOUBLE

In general the same principles as have been outlined apply to the data accumulation and computation for the Daily Double. Differences are described as follows:

6.1 Ticket Dispensers and Wiring

Ticket dispensers will have the facility for registering and printing on tickets two horse numbers, one each for the first and second races. Scanning of these dispensers is very similar to that described previously. As with the 300 windows, the 150 Daily Double windows have an "unlock" feature.

6.2 Data Accumulator

The memory has to store the accumulated data. As before, a plugboard enables any of the 150 windows to be set up for any desired bet amount, but no win, place or show designation is required.

6.3 Computation and Display

During the betting preceding the first race no computations are made with the exception of the accumulation of window totals and the total net distribution. The latter figure is displayed on the Daily Double board.

As soon as the winner of the first race has been announced by the judges the payoff on each horse in the second race is computed and fed to the display board (and to the cashiers). The results of the computation are available for display within five seconds of the judges' decision on the results of the first race.

7. SAFETY AND PREVENTION OF OPERATING LOSSES BY DUPLICATION OF EQUIPMENT

In order to provide as much of a safeguard against errors as possible certain parts of the equipment will be duplicated. Where duplicate equipment is provided, both units operate simultaneously and their results are continuously compared, any discrepancy indicating an error.

The complete data accumulator and the computer are both duplicated. Ticket dispensers and display equipment, however, will not be duplicated.

As has already been indicated, a number of built-in error checks are provided. While some of these might possibly be omitted in view of the duplication, they have a definite advantage. In case of equipment failure in one of the duplicated units, operation can continue with the remaining unit on a temporary basis, with the built-in error checks now serving to reduce greatly the chance of undetected errors in the equipment being used.

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8. TYPE OF EQUIPMENT

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8.1 Basic Building Blocks

The basic building block of Digitronics equipment involves the use of highly flexible logical circuitry. This circuitry, which is based on a group of transistorized printed circuit plug-in boards of our own design and manufacture, has proven its reliability in some of the most stringent acceptance test criteria developed for commercial data handling equipment. Figure 8.1 is an illustration of one of these plug-in units. By varying the interrelationship of these standard packages the advantages of special custom designed equipment at mass production costs can be obtained.

8.2 Modular Construction

Figure 8.2 is an illustration showing a control panel, two plugboards and several frames of plug-in units.

8.2.1 The control panel is designed to give the operator the immediate visual information required for control of the system. The panel of switches and pushbuttons is compact durable and readily accessible.

8.2.2 The plugboard likewise is accessible and enables the assignment of win, place or show and amount of bet to any window to be made in a very short time.

8.2.3 The plug-in card frames illustrate several features. It is obvious that assembly of the plug-in components is a quick simple operation. Each card is so arranged as to be readily accessible for check-up and preventative maintenance. Repairs can be made with little loss of machine time by simply replacing a faulty card with a spare. The malfunctioning card can then be examined and repaired at leisure.

8.3 Transportability

The equipment will be completed transportable and can be set up, checked out and operating within a few hours. The maintenance operation described below includes the installation and check out at a new site in the Metropolitan area twice each year.

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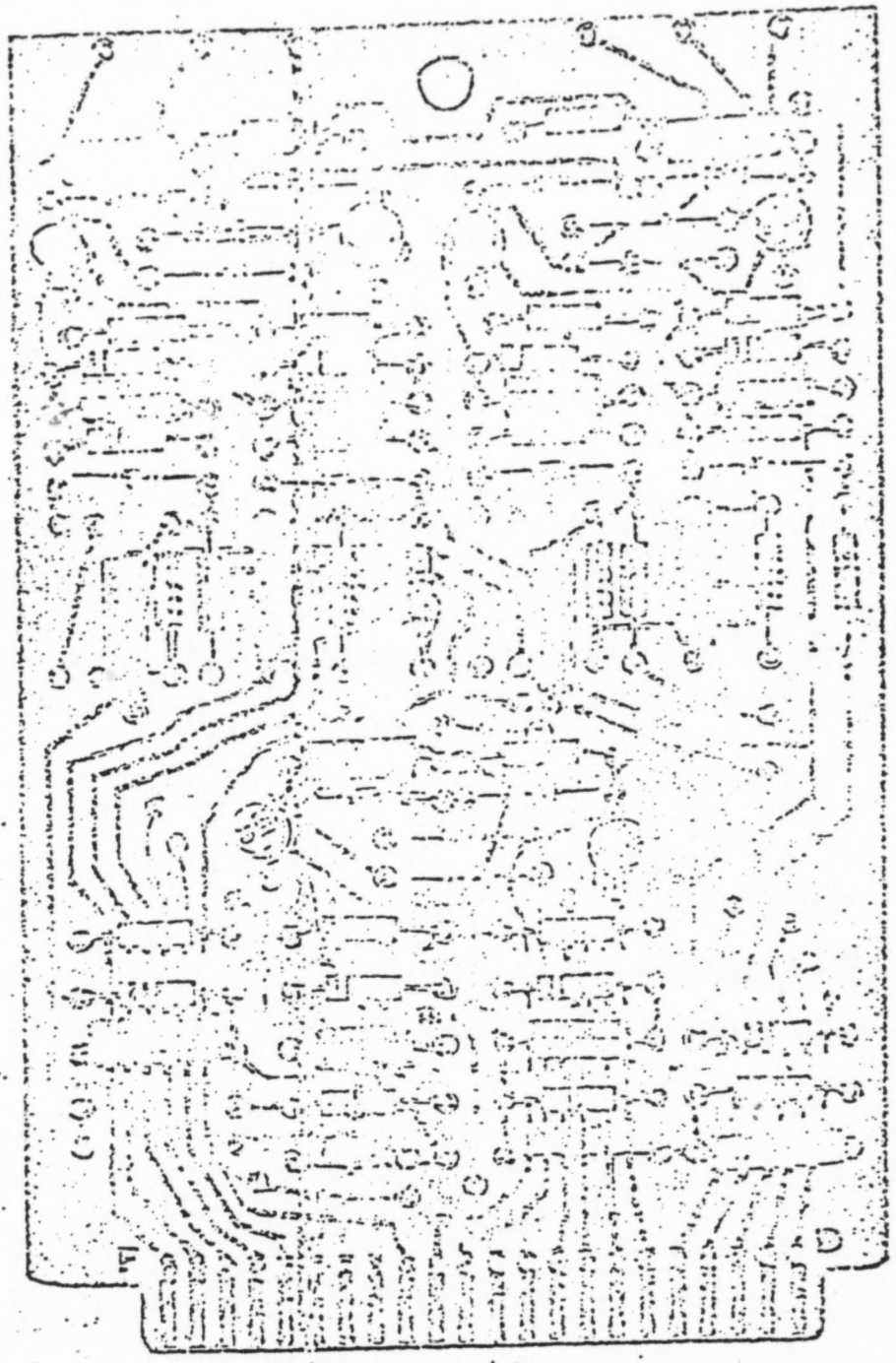

Fig. 8.1

STANDARD DIGITRONICS PLUG-IN UNIT - FLIP-FLOP CARD

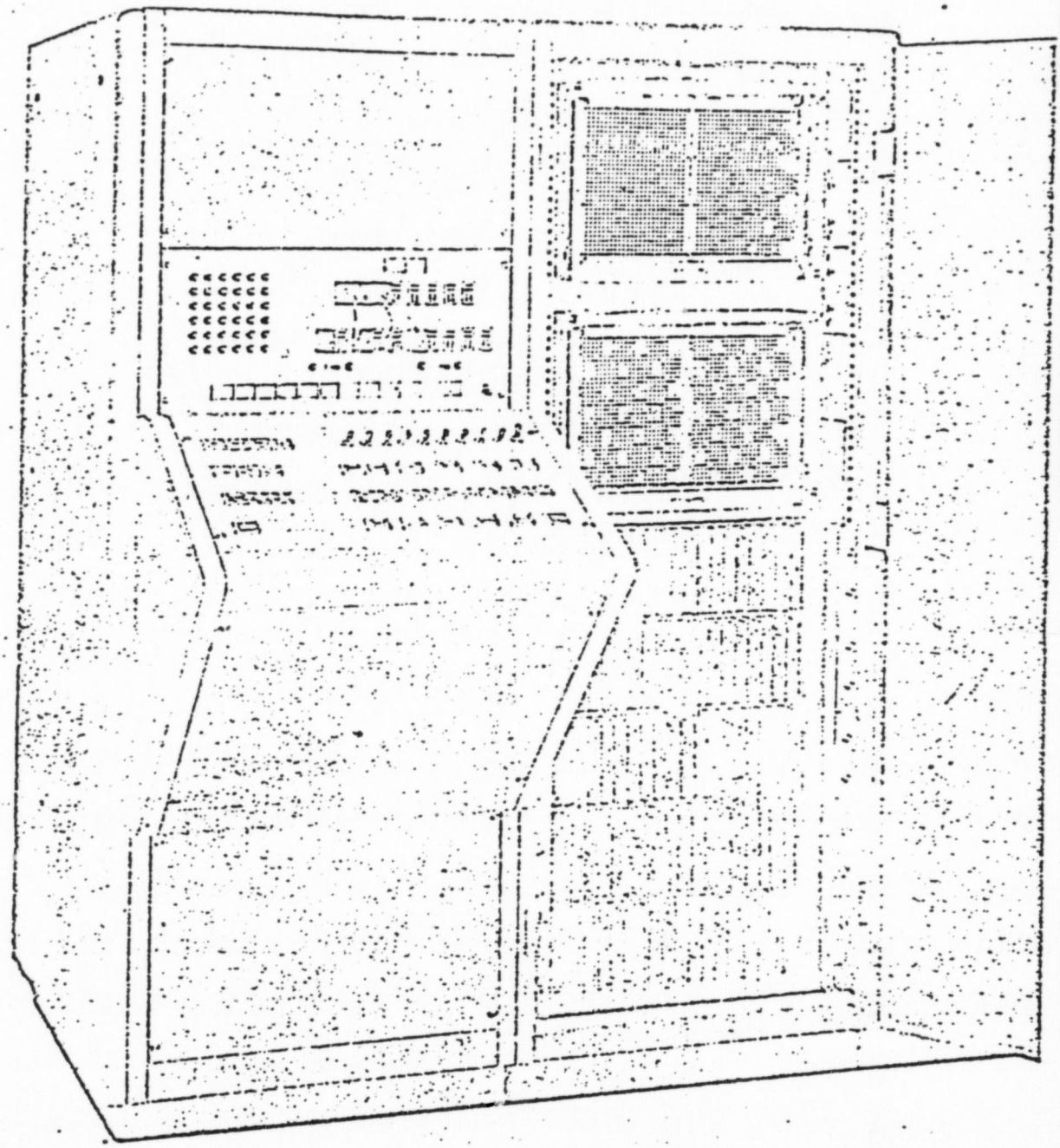

Fig. 3.2

DIGITRONICS UNIT SHOWING CONTROL PANEL, PLUGBOARDS AND FRAMES OF PLUG-IN UNITS

9. MAINTENANCE AND GUARANTEE

9.1 Acceptance

Digitronics will incorporate an acceptance test in its contract. This test will positively demonstrate the equipment reliability and accuracy. At the conclusion of such a test, the equipment construction and installation is deemed complete.

9.2 Maintenance

Digitronics will enter the maintenance phase of the contract relationship upon completion of the first phase. A crew of five men will be at the track to check out and standby the equipment before and during each daily program of six races. An advantage to Roosevelt Raceway will accrue due to the proximity of Digitronics to the track.

Spare parts inventory can be minimal and top-level technical consultation will be readily available during the check out period prior to race time. The maintenance contract will run on a year to year basis with the cost re-negotiable each year. However, Digitronics will not have the right to unilaterally refuse renewal at the end of any year before the tenth year. In any event Digitronics will give one year notice as regards intention to terminate.

9.3 Warranties and Guarantees

Warranties with respect to materials and workmanship will be provided for the first year following acceptance. A schedule of replacement part costs will be presented on a yearly basis as part of the maintenance contract renewal. Digitronics will guarantee the system design for a period of ten years. It is possible that some unforeseen combination of events may arise such that the equipment creates an error (which is always detected) as a result of the inherent design. In such event Digitronics will correct the equipment design at no cost.

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DEFENDANT'S EXHIBIT K NO. 6 C 1119

ARITHMETIC OPERATIONS IN DIGITAL COMPUTERS

R. K. RICHARDS, PH.D.
Development Engineer
International Business Machines Corporation

SIXTH PRINTING

D. VAN NOSTRAND COMPANY, INC.
PRINCETON, NEW JERSEY
TORONTO LONDON
NEW YORK

A847

Chapter 2

BOOLEAN ALGEBRA APPLIED TO COMPUTER COMPONENTS

Boolean algebra derives its name from George Boole, who first introduced it in 1847 in a paper on the mathematical analysis of logic. The adaptability of this form of algebra to telephone and computer switching circuits appears to have been first pointed out by C. E. Shannon some ninety years later (1938) in the *Transactions* of the American Institute of Electrical Engineers. Since 1938 the interest in Boolean algebra and the extent of its use have grown rapidly with its growth closely paralleling the rapid development of complex switching networks as found in automatic telephone dialing systems and in large digital computers.

Boolean algebra is very different from ordinary algebra at first glance, and for this reason it may seem confusing or even a little ridiculous. Actually, it is an extremely simple algebra and, as will be shown, is of great value in the design of switching networks. However, one point should be understood from the start: it does not lead directly to the "best" circuit (usually the circuit with the least number of components, although sometimes other criteria are more important) in the same sense that, for example, calculus can be used to find minima in a function. What the algebra does provide is a convenient means of representing a switching circuit without drawing the circuit. Also, and probably more important, is the fact that it provides a means for quickly finding a multitude of different circuits that will perform any desired switching function. With a little practice, the circuit designer thereby has a powerful tool to aid him in finding a "good" circuit, even though it may not be the "best" one.

Basic Principles of Boolean Algebra. In Boolean algebra, there are only two different quantities or values which come into consideration, and these quantities are 0 and 1. Arithmetic operations in Boolean alge-

bra with "numbers" which can be only 0 or 1 bear little resemblance in meaning to the arithmetic operations in ordinary algebra, although in many instances the rules for performing the operations are the same. In particular, addition will be assigned the meaning of "or," and multiplication has the meaning of "and." The results obtained when "adding" and "multiplying" the various combinations of 0's and 1's are as follows:

$$0 + 0 = 0 \qquad 0 \times 0 = 0$$
$$0 + 1 = 1 \qquad 0 \times 1 = 0$$
$$1 + 1 = 1 \qquad 1 \times 1 = 1$$

The first equation involving "addition" has the meaning, "0 or 0 is equal to 0." The second equation has the meaning "0 or 1 is equal to 1," because the "or" function, as indicated by the plus sign, serves to signify that the resultant quantity is 1 if either of the given quantities is 1. This interpretation of the "or" function includes the case where both of the given quantities are 1; therefore, "1 or 1 is equal to 1." Since there is no such quantity as 2 in Boolean algebra, the latter equation is, of necessity, different from anything found in ordinary algebra. A simple example of the Boolean algebra "or" function would be a fire-alarm device which may be actuated by signals from two different sources. The signal from each source may be represented by a 1, and the absence of a signal may be represented by a 0. The signal lines from the two sources should be combined so that the alarm will sound whenever a signal is received from either source. In other words, a signal is sent to the alarm when a signal is received from one source "or" the other source. Of course, if signals are received from both sources simultaneously, the alarm will sound in this case also, but not with twice the amplitude.

The equations involving "multiplication" have corresponding meanings, but with the word "and" substituted for "or." The "and" signifies that the resultant quantity is 1 only when both of the given quantities are 1. The last equation, which states that "1 and 1 is equal to 1," should not be confused with addition in ordinary algebra. An elementary example of an "and" function would be the firing of an explosive charge through the use of two signals where, in the interest of safety, it is required that both signals be present simultaneously in order to cause the charge to explode. The charge will explode only when a signal is received from one source "and" the other source also.

As in ordinary algebra, symbols may be used to represent "unknowns" or "variables," although the range of variation is limited to one or the other of the two discrete quantities, 0 and 1. The symbolic equation

$C = A + B$, for example, means that C is 1 if A "or" B is 1 (or if both are 1); otherwise, C is 0. Similarly, the equation $C = AB$ means that C is 1 only if both A "and" B are 1; otherwise, C is 0.

From the above definitions, the following relationships may be obtained directly:

$$A + 0 = A$$
$$A + 1 = 1$$
$$A + A = A$$
$$A0 = 0$$
$$A1 = A$$
$$AA = A$$

The meaning of these equations may be readily understood by substituting for A each of the two possible values it may have.

Both the "or" and "and" functions are commutative and associative.

$$A + B = B + A$$
$$AB = BA$$
$$(A + B) + C = A + (B + C)$$
$$(AB)C = A(BC)$$

Also, each function is distributive with respect to the other.

$$AB + AC = A(B + C)$$
$$A + BC = (A + B)(A + C)$$

These equations are not definitions, but are natural consequences of the nature of the "or" and "and" functions. For example, if A "and" B is 1 or if A "and" C is 1, it must be that A is 1 "and" that B "or" C is 1. The last two equations above are not independent of one another as may be observed by multiplying out $(A + B)(A + C)$ and simplifying according to the rules of the preceding equations.

$$\begin{aligned}(A + B)(A + C) &= (A + B)A + (A + B)C \\ &= A + BA + AC + BC \\ &= A(1 + B + C) + BC \\ &= A + BC\end{aligned}$$

A848

With the above set of basic rules it is possible to solve a wide variety of Boolean algebra problems. A simple but illustrative example is proving that $A(A + B) = A$. The steps in one form of the proof are as follows:

$$A(A + B) = AA + AB = A + AB = A(1 + B) = A1 = A$$

A fundamental concept which is found in Boolean algebra and which has no counterpart in ordinary algebra is the "not" function, as indicated by a line over a symbol. In particular, $\bar{0}$ means "not 0" and has the value of 1 because, if it is not 0, the only other value it can have is 1. Similarly, $\bar{1}$ has the value of 0. From this definition it follows that, if a variable, A, is 0, then $\bar{A}$ (called "not A") is 1; but, if A is 1, then $\bar{A}$ is 0. From this definition and the nature of the "or" and "and" functions, the following equations may be obtained.

$$A + \bar{A} = 1$$

$$A\bar{A} = 0$$

$$\bar{\bar{A}} = A$$

Two other important equations are

$$\overline{ABC} = \bar{A} + \bar{B} + \bar{C}$$

and

$$\overline{A + B + C} = \bar{A}\bar{B}\bar{C}$$

where the line over a group of symbols means that the "not" function applies to the entire expression under the line. These equations are shown for three variables, although analogous equations exist for any number of variables. The validity of the equations may be established easily by allowing the variables to take on the two possible values, 0 and 1, in all possible combinations. To obtain a better visualization of the meanings of the equations, it may be observed that the left-hand side of the first equation is 1 when the quantity ABC is 0, and ABC will be 0 whenever any of the individual variables are 0, which is exactly the same condition that will cause the right-hand side of the equation to be 1. For the second equation, a corresponding observation may be made.

It is now possible to prove, for example, that

$$\overline{AB + BC + CA} = \bar{A}\bar{B} + \bar{B}\bar{C} + \bar{C}\bar{A}$$

which is an equation arising in the study of binary adders. One way to establish the equality is to apply the equations given above according to the method outlined on the next page.

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$$\begin{aligned}\overline{AB + BC + CA} &= \overline{(AB)}\,\overline{(BC)}\,\overline{(CA)} \\ &= (\bar{A} + \bar{B})(\bar{B} + \bar{C})(\bar{C} + \bar{A}) \\ &= (\bar{A}\bar{B} + \bar{A}\bar{C} + \bar{B})(\bar{C} + \bar{A}) \\ &= \bar{A}\bar{B} + \bar{B}\bar{C} + \bar{C}\bar{A}\end{aligned}$$

The operations of subtraction and division have no parallel in this system of Boolean algebra. Division, in particular, is to be avoided; quantities cannot be "divided out" according to the familiar rules used in ordinary algebra. An example is the equation,

$$(A\bar{B} + B\bar{C} + C\bar{A})(\bar{A}\bar{B} + \bar{B}\bar{C} + \bar{C}\bar{A}) = (A + B + C)(\bar{A}\bar{B} + \bar{B}\bar{C} + \bar{C}\bar{A})$$

where the quantity, $\bar{A}\bar{B} + \bar{B}\bar{C} + \bar{C}\bar{A}$, cannot be divided out because

$$A\bar{B} + B\bar{C} + C\bar{A} \neq A + B + C$$

It is instructive to prove by means of the relationships already discussed, first, that the equation is correct and, second, that the inequality is correct. A more obvious example is the equation, $A(A + B) = A$, where the factor, A, cannot be divided out because $A + B$ is not necessarily equal to 1.

The subject may be extended far beyond the elementary points presented here, but the definitions and relationships which have been given should be sufficient to take care of all of the problems and applications to be presented. However, as an indication of the direction in which further development of Boolean algebra proceeds, the following equations are presented without proof.

$$f(A, B, C) = Af(A, B, C)_{A=1} + \bar{A}f(A, B, C)_{A=0}$$

$$f(A, B, C) = [A + f(A, B, C)_{A=0}][A + f(A, B, C)_{A=1}]$$

Here the notation, $f(A, B, C)_{A=1}$, for example, means any arbitrary function of A, B, and C but with the value, 1, substituted for A and the value, 0, substituted for $\bar{A}$.

It should not be construed that the system of Boolean algebra notation used here is universally accepted. In fact, several different types of symbols have been employed by various writers to indicate the "and" and "or" functions. Also, the "not" function may be represented in a number of different ways, some of which differ by more than just the choice of a symbol. However, the system of notation which has been described is well suited for the application, algebraic manipulations are straightforward, the symbols are easily learned and remembered, and the confusion with the ordinary algebraic functions which might be expected

An important variation in the notation may be obtained by interchanging the "product" and "sum" indications with respect to the "and" and "or" operations. It happens that all of the basic relationships are correct with either convention. Whichever convention is chosen, it is occasionally desirable in the design of computer circuits to apply the opposite convention to the solution of a problem. In this way it is sometimes possible to discover quickly certain circuit arrangements which might otherwise be overlooked. Since the use of both conventions does involve a certain amount of confusion, the procedure will not be described further.

Application to Computer Components. The bare rules of Boolean algebra, as described in the previous section, probably seem somewhat

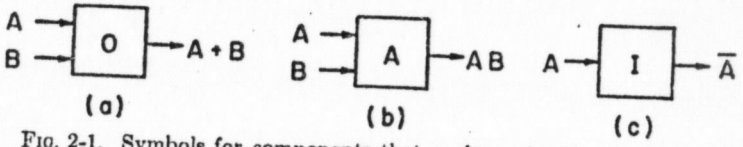

FIG. 2-1. Symbols for components that perform the basic functions.

artificial and pointless when considered by themselves, but their meaning and application should become more understandable when the correlation between the functions and computer components is described in more detail.

A simple "or" switch will be symbolized by a block labeled with the letter O. The "or" switch may have any number of inputs, and each input will be indicated by a separate line with an arrow pointing in the direction of the block. The output from the switch correspondingly will be represented by a line with an arrow pointing away from the block, as indicated in Fig. 2-1(a). If the input signals to a two-input "or" switch are represented by the variables, A and B, and the output by C, the functional relationship between the output and the inputs may be designated by the equation, $C = A + B$. Of course, the input variables are always the independent variables, with the output being dependent upon the inputs. Again, each variable is either 1 or 0, according to the presence or absence of a signal on its corresponding line. The equation, therefore, has the meaning that a signal will be present on line C if a signal is present on line A "or" on line B (or both).

With practical circuits and components, the nature of the signal on a line may assume any of a wide variety of forms. A frequently used form of signal is a positive voltage to represent a 1 and a negative voltage to represent a 0, where "positive" and "negative" are potentials relative to each other and not necessarily relative to ground potential. Another

form of signal could be a transient pulse of voltage of either polarity. Further, the signal need not even be electrical; mechanical motions of various descriptions may be used.

A simple "and" switch will be symbolized, correspondingly, by a block labeled with the letter A, as shown with two inputs in Fig. 2-1(b). In the case of the "and" switch, the functional dependence of the output, C, expressed in terms of the inputs, A and B, may be represented by the equation, $C = AB$. The meaning of the equation is that C is 1 only when both A "and" B are 1.

The "not" operation, or inversion, is symbolized by a block labeled with the letter I. If the input to an inverter is A, the output is $\bar{A}$.

Diodes. Because of the wide application of the diode switch, a brief description of this particular form of switch will be given. With the

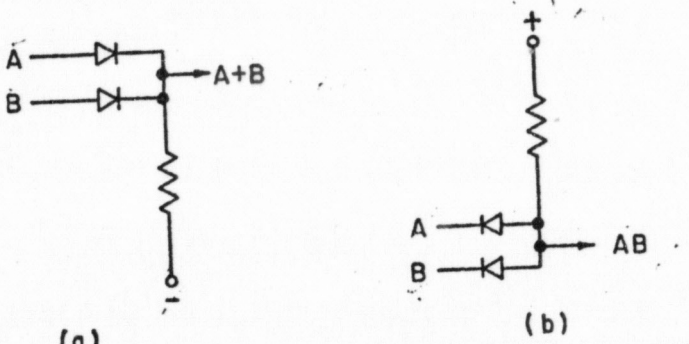

FIG. 2-2. Diode "or" and "and" circuits (1 and 0 are represented by positive and negative voltages, respectively).

assumption that 0's and 1's are represented by relatively negative and positive potentials, respectively, the diode "or" circuit is shown in Fig. 2-2(a). The diodes are connected to a common load resistor, which in turn is connected to source of relative negative voltage. Each diode will pass current freely in the direction of the "arrow," but offers a high impedance to the flow of current in the other direction (electron flow is against the arrow). Then, when both input lines indicate 0, the output line will also indicate 0 because the diode resistance to current flow in this direction is assumed to be negligible compared to the resistance of the load resistor. If either one of the input lines is raised in potential to indicate a 1, the output line will indicate a 1, since an increased amount of current will be caused to flow in the load resistor. In other words, the output line will still be connected through a relatively low impedance to the input line with a 1-signal, and the diode corresponding to the input line with a 0-signal will not pass current because the potentials on its

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terminals will be in the high-impedance direction of this particular diode. Therefore, the output will be positive if one input line "or" the other (or both) is positive.

The diode circuit for forming an "and" switch is indicated in Fig. 2-2(b). The circuit is similar to the "or" switch except that the connections of the diodes are inverted and the load resistor is connected to source of relatively positive potential. With the "and" switch, if both of the input lines are held at a relatively negative potential to represent 0's, the output line will also be at the same relatively negative potential because the voltage drop from the positive supply will appear across the resistor and not the diodes. When the potential of one of the input lines is raised to indicate a 1, the corresponding diode will have a voltage impressed across it which is in the reverse, or high-impedance direction, and the potential of the output line will be unaffected. Only when 1's appear on both input lines will potential on the output line become relatively positive as is required for a 1 indication. In other words, the output line will become positive only when one input line "and" the other line also become positive.

It should be noticed that the roles of the circuits in Fig. 2-2 become interchanged when a 1 is represented by a negative instead of a positive potential. For example, in Fig. 2-2(a) the output becomes negative when both of the input lines are negative, and in (b) the output becomes negative when either input line is negative. For this reason, in identifying "or" and "and" circuits, it is necessary to specify the polarity of signals which are in use.

The importance and usefulness of Boolean algebra notation arise from the fact that each algebraic expression represents a different physical circuit, even when the expressions are mathematically equivalent. As an example of this property of the relationship between the notation and the circuits, consider a switching network with four input lines, A, B, C, and D, and with an output line, E, which is 1 when A "and" B are 1 or when C "and" D are 1. The Boolean algebra expression is $E = AB + CD$, and the switching network which will perform this function is shown in Fig. 2-3(a). However, it is possible to write down the desired switching function in other ways. One other way is indicated by the following equation.

$$AB + CD = (A + C)(A + D)(B + C)(B + D)$$

The expression on the right-hand side of the equation describes the switching arrangement shown in Fig. 2-3(b). The correctness of the equation may be established either by multiplying out the terms in the right-hand side or by factoring the left-hand side and arriving at the expression,

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$(A + CD)(B + CD)$, as a first step. That the arrangement in Fig. 2-3(b) yields the desired switching function may be understood by observing that both A and B must be 1, or both C and D must be 1 in order to cause signals to be present on all four input lines of the "and" switch, which is the necessary condition for a 1 to appear on the output line.

In spite of the functional equivalence of the two arrangements in Fig. 2-3, the physical difference in the two circuits is by no means trivial.

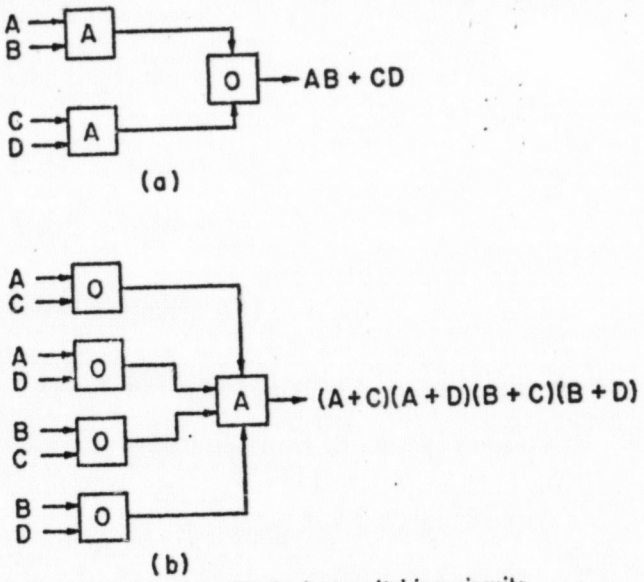

FIG. 2-3. Equivalent switching circuits.

With the diode switching circuits which have been described, the number of diodes in any "or" or "and" switch is equal to the number of inputs to the switch. Therefore, a total of 6 diodes is required to form the circuit in (a), but 12 diodes are required in (b). If the switching circuit given in (b) had been given first, a reduction in the required number of diodes could have been achieved merely by performing algebraic manipulations without any consideration to the switching circuits themselves. Unfortunately, it is not always possible to arrive in a direct manner at the switching network which gives the desired switching function with the minimum number of components. However, the important point is that each manipulation of a Boolean algebra expression represents a physical change in the switching network without a change in the switching function; that is, without a change in the relationship between the output and input signals. Therefore, Boolean algebra provides not only a convenient

notation for recording switching networks without drawing them out in detail, but also a means for making changes in the network configuration in the search for the most desirable network for any given switching function. Numerous practical examples of the notation employed for this purpose will be found in subsequent chapters.

The Vacuum Tube. The vacuum tube is another frequently used component in computers although its application to "or" and "and" switching functions is not quite as straightforward as in the case of diodes. The fundamental triode vacuum-tube circuit is shown in Fig. 2-4(a). The input voltage, which for the purpose at hand is assumed to be taken from the anode of another vacuum-tube circuit, is applied to a voltage divider comprised of resistors R_1 and R_2. The circuit is so designed and the supply voltages are so chosen that the potential of the grid will be maintained either below cut-off value or slightly above ground potential. The output potential, which is developed across the anode load resistor, R_3, is positive when the input is negative and is negative when the input is positive. "Positive" and "negative" potential here are relative to each other and not relative to ground. Because of the nature of this triode circuit, it is an inverter; that is, if a signal, A, is applied to its input, the signal appearing on the output line is $\bar{A}$. The functional properties of the simple triode may be represented by a block labeled "I" with one input and one output line as in Fig. 2-4(b). Sometimes a triode circuit is more conveniently indicated by a symbol, such as shown in Fig. 2-4(c), with the input grid connection in the lower-left corner and the output anode connection in the upper-right corner.

When two triode circuits are connected with a common anode load resistor, as shown in Fig. 2-4(d), the functional result depends upon the convention used in the assignment of polarities. If a positive signal represents a 1 and a negative signal represents a 0, the function is equivalent to two inverters feeding an "and" circuit. This function may be visualized by noting that the output will be positive only when both of the inputs are negative. The function is the same as that of an "or" circuit feeding an inverter because, as has been pointed out, $\overline{AB} = \bar{A} + \bar{B}$. The corresponding functional block diagrams for two triodes with their anodes connected together are given in Fig. 2-4(e). If the opposite convention with respect to polarities had been assumed, the "and" and "or" functions would be interchanged. When the symbols for two or more triodes (or multigrid tubes) are shown with the output terminals connected together as in Fig. 2-4(f), it is implied that there is only one anode load resistor in the circuit and that the value of its resistance is substantially the same as would be used for one tube alone.

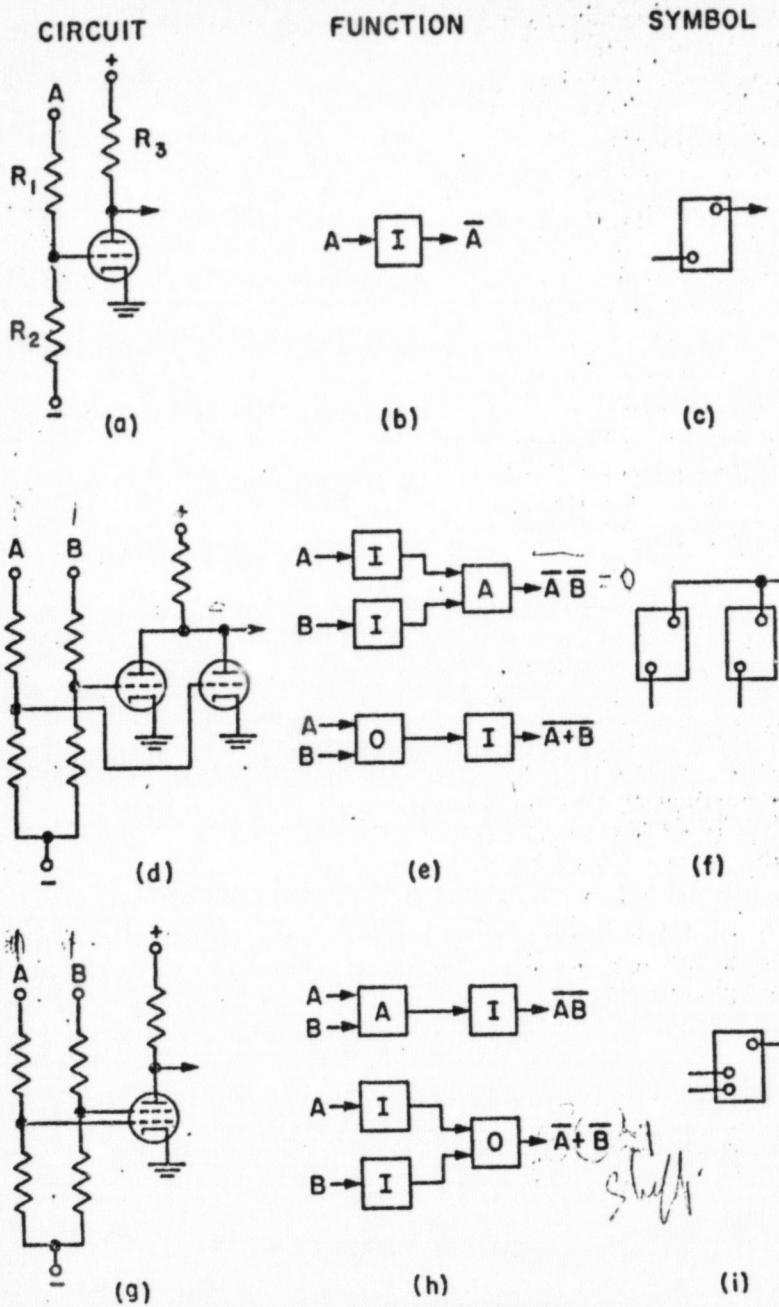

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Fig. 2-4. Vacuum-tube functions.

A circuit employing a tube with two control grids is shown in Fig. 2-4(g). The functional nature of this circuit may be represented by an "and" circuit feeding an inverter as can be determined by noting that the output will be negative only when both input signals are positive. An equivalent functional arrangement is two inverters feeding an "or" circuit. As in the case of the two triodes, the functional properties of the multigrid tube depend upon the assumption made concerning the polarities of the signals. It has been assumed that a positive signal represents a 1; if a negative signal represents a 1, the "and" and "or" operations would be interchanged. The symbol which will be used for the two-grid tube is the same as for the triode except that two input terminals are placed in the lower-left corner of the rectangle. Tubes with three or more control grids can be constructed; however, they are generally considered to be impractical not only because they would involve a more complicated and possibly inefficient electrode arrangement, but also because conventional triodes and two-grid tubes can be adapted to any functional operation and their large volume of production causes them to be less expensive.

For simplicity, certain important, although nonessential, components have been omitted from the circuits in Fig. 2-4. Among the omissions are devices for suppressing parasitic oscillations (usually low-value resistances in series with the grids), condensers across the upper resistances in the voltage dividers for increasing the speed of the circuits, and various screen and suppressor grids which may be desirable particularly in the two-grid tube.

It is possible to assemble vacuum-tube circuits to yield any desired switching function. For example, the elementary "or" and "and" switches may be formed with nothing but triodes, as indicated in Fig. 2-5. With these two "components" together with the single triode used as an inverter, the assembly of any switching function may proceed in a straightforward manner, but the circuit so obtained will, in general, contain many more tubes than necessary. The problem of arriving at the circuit composed of the least possible number on tubes is a formidable one. In the text, *Synthesis of Electronic Computing and Control Circuits*, by members of the staff of the Harvard Computation Laboratory (Harvard University Press, 1951), a system is presented for arriving at economical circuits when a limited number of input signals and one output signal are involved. Also, some special cases involving multiple output switching circuits are included. However, since the system has its complications and limitations, and since engineering details often dictate numerous special considerations, it is usually necessary to resort to "cut-and-try" methods in order to obtain the most desirable circuit.

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Boolean algebra is nevertheless a useful tool in the design of vacuum-tube switching circuits, because it provides a means for quickly and accurately analyzing the switching arrangement obtained at each stage of the development. To determine the relationship between the output signals and input signals in any switching circuit, it is sufficient to write down the output of each tube or set of tubes with common anode connec-

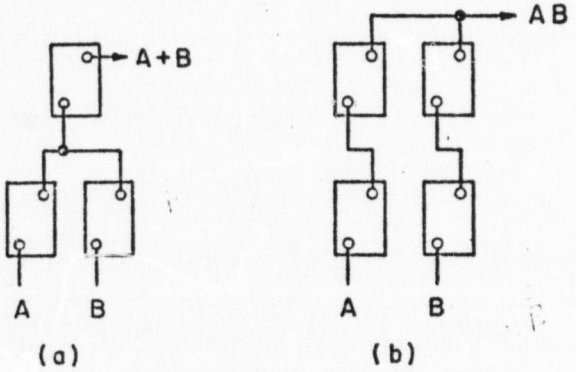


FIG. 2-5. Triode "or" and "and" circuits.

tions in terms of the signals on the corresponding grids in accordance with the functions shown in Fig. 2-4(b), (e), and (h). The case where multigrid tubes have their anodes connected in common with the anodes of other tubes may be handled conveniently by visualizing each multigrid array as constituting an "and" switch, the tube itself as constituting an inverter, and the common anode connection as constituting another "and" switch. An example of this sort is shown in Fig. 2-6. After proceeding

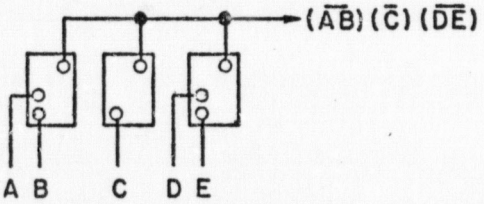


FIG. 2-6. Multi-grid tubes with common anode connection.

through all tubes from the input lines to the output lines, the resulting expressions for the output signals may, of course, be rearranged as desired when they are not immediately in suitable form.

Gate Tubes. The two-grid tube discussed in the previous section is sometimes used in such a different manner that it is worthy of special mention. Through the use of a two-grid tube, a pulse-type signal may be

"gated" by the presence or absence of another signal, which may be either a steady-state type of signal or another pulse. The distinguishing feature of a tube used in this manner is that the output is always a pulse, and therefore a transformer may be placed in series with the anode to obtain an output pulse which has the same polarity as the pulse being gated. Functionally, a gate-tube circuit of this sort is a simple "and" switch.

A conventional pentode may be used as a gate tube, in which case it is customary to apply the pulse input to the control grid and the gating signal to the suppressor grid. The opposite connection is not used because a steady-state signal applied to the control grid would cause excessive current to the screen grid in the absence of a signal on the suppressor.

Relays. The basic "or," "and," and "not" circuits as performed with relays are shown in Fig. 2-7. The input signals are applied to the coils

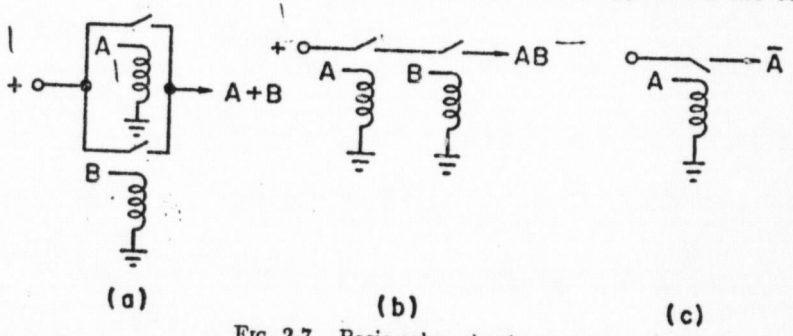
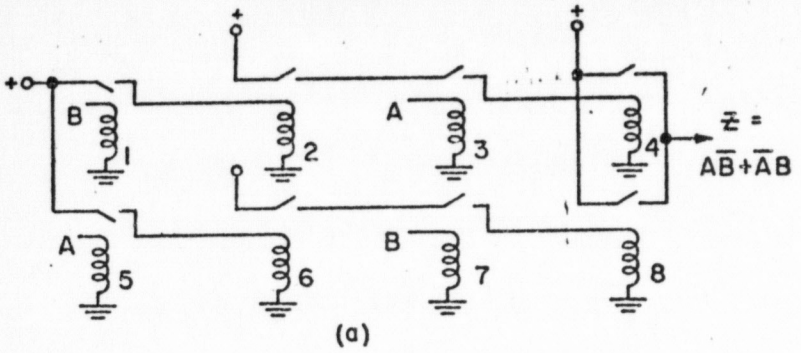


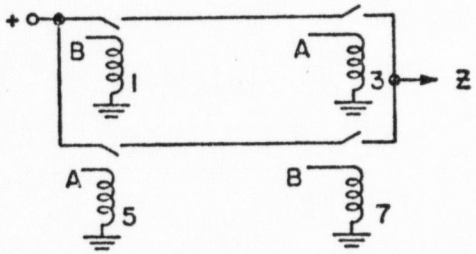
FIG. 2-7. Basic relay circuits.

of the relays, and when a coil is energized it attracts the armature toward it. In the case of the "or" and "and" circuits, the effect is to close contacts which are normally open; but for the "not," or inverter, function, a normally closed contact is opened by the action of the coil. In the figure, the symbol for the relay armature is drawn so that its normal state may be determined by noting whether motion toward the coil would tend to close or open the contact. It will be assumed that positive polarity voltages are used to actuate the coils and to provide the signals through the contacts, although negative voltages could be used just as well. The "or" switch is simply a parallel connection, a signal applied to one relay "or" the other will cause a signal to appear on the output line. The "and" switch is a series connection where one relay "and" the other must be energized to yield an output signal. In the "not" circuit, an output signal appears except when an input signal is applied, which causes the contact to open.

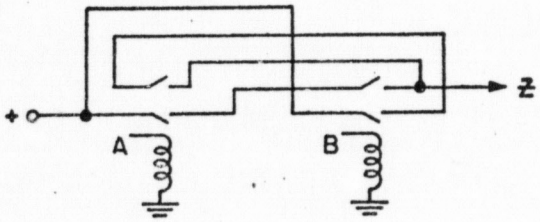
Compromises between the schemes shown in Figs. 7-2 and 7-3 may



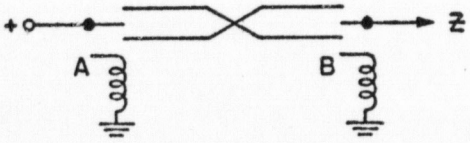
(a)



(b)



(C)



(d)

FIG. 2-8. Relay circuits for $A\bar{B} + \bar{A}B$.

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Any desired switching function may be assembled through the use of the three basic circuits by following exactly the same procedures that would be used to assemble switching arrangements composed of diodes and vacuum-tube inverters. However, the circuits so obtained would be wasteful of relays and contacts because there are several ways by which relay switching networks may be simplified which are not applicable to other types of components. As an example, consider the switching function $Z = A\bar{B} + \bar{A}B$. The "straightforward" way to form such a switching function would be to invert X and Y, then apply the signals to relay "and" circuits each composed of two relays, and finally apply the outputs of the "and" circuits to a two-relay "or" circuit. This configuration is shown in Fig. 2-8(a).

One fact that may be used to reduce the number of relays appearing in Fig. 2-8(a) is that no relays at all are required to form an "or" circuit when the inputs to the "or" circuit are from the contacts of other relays. Therefore, relays numbered 4 and 8 may be eliminated simply by connecting together the contacts on relays numbered 3 and 7. Further, it is not always necessary to use two relays to perform an "and" function; an "and" circuit may be made by applying one signal to the contact and the other signal to the coil of a single relay. By this means, relays numbered 2 and 6 may be eliminated. The resulting circuit is given in Fig. 2-8(b). Since it is not necessary that each contact have its own separate actuating coil, the number of relay coils may be reduced by mounting all contacts operated by the A signal on one relay and all contacts operated by the B signal on a second relay, as shown in Fig. 2-8(c).

By the use of transfer points, another reduction in circuit complexity may be achieved. A transfer point corresponds to the "double-throw" switch used in electrical power work. The moving point makes a contact at each end of its motion. That transfer points may be used in the switching function presented in Fig. 2-8 is not exactly obvious, but it may be determined readily when it is observed that in an "and" circuit the order or sequence of the contacts makes no difference and that the connections to an individual contact may be reversed if desired. When these steps are taken, the circuit given in Fig. 2-8(d) can be derived. The derivation can probably be visualized more easily through study of (b) than (c); in (b) if relays 1 and 3 are interchanged and if the connections to the contacts on the relays actuated by B are reversed, the circuit in (d) follows almost directly.

The switching function, $Z = A\bar{B} + \bar{A}B$, may be generated by other relay circuits involving interesting variations if the expression is factored according to the following steps:

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$$A\bar{B} + \bar{A}B = (A + \bar{A}B)(\bar{B} + \bar{A}B)$$
$$= (A + \bar{A})(A + B)(\bar{B} + \bar{A})(\bar{B} + B)$$
$$= (A + B)(\bar{A} + \bar{B})$$

The "straightforward" relay circuit for providing the switching function according to this expression is shown in Fig. 2-9(a). $A + B$ is formed by relays 1 and 2; relays 5 and 6 combine $\bar{A}$ with $\bar{B}$ to form $\bar{A} + \bar{B}$; and relays 7 and 8 perform the final "and" operation. Since the inputs to relays 5 and 6 come from other relays, this "or" function may be accomplished simply by connecting the outputs of relays 3 and 4 together. Also, it is possible to eliminate relays 7 and 8 by connecting the two "or" circuits in series instead of applying to outputs of the "or" circuits to separate relays which have their contacts in series. The resulting arrangement is given in Fig. 2-9(b). As before, all contacts actuated by the signal may be combined on one relay, and in this case the circuit of Fig. 2-9(c) is obtained. By reversing the connections to the contacts on relays 1 and 2 in Fig. 2-9(b), it is possible to make use of transfer points as shown in Fig. 2-9(d). Note that each of the circuits in Fig. 2-9 is different from the circuits in Fig. 2-8; yet the switching function is the same in every case.

It is necessary to be cautious when using the simplifications described in the previous paragraphs because of the possibility of getting undesirable "back circuits" in the system. Two examples of situations where back circuits can arise are shown in Fig. 2-10 (coils not shown). In (a) the desired switching function is $(AB + CD)\,E + (CD)F$. The term, CD, is generated by a series connection of contacts on relays operated by the C and D signals. If this term is combined with AB in an "or" function by merely connecting the wires together instead of using separate relays for the "or" function, it cannot be combined with F with nothing but another series connection. The reason is that a path from the supply voltage to the output line would be closed when $ABF = 1$, which is not desired. By placing a diode, as indicated, current flow through that particular wire is limited to one direction, and the undesired connection is eliminated. In (b) the switching function is $(AB + D)\,C + AE$, but without the diode the term DBE would be included also since the contacts can pass current in either direction. If the use of diodes is objectionable, the difficulty may be avoided without employing individual relays for every "or," "and," and "not" function by using duplicate contacts for certain input signals. In Fig. 2-10(a), back circuits could have been avoided by using duplicate contacts for C and D; in (b) a duplicate contact for A would be sufficient.

An alternative method of eliminating back circuits in the switching

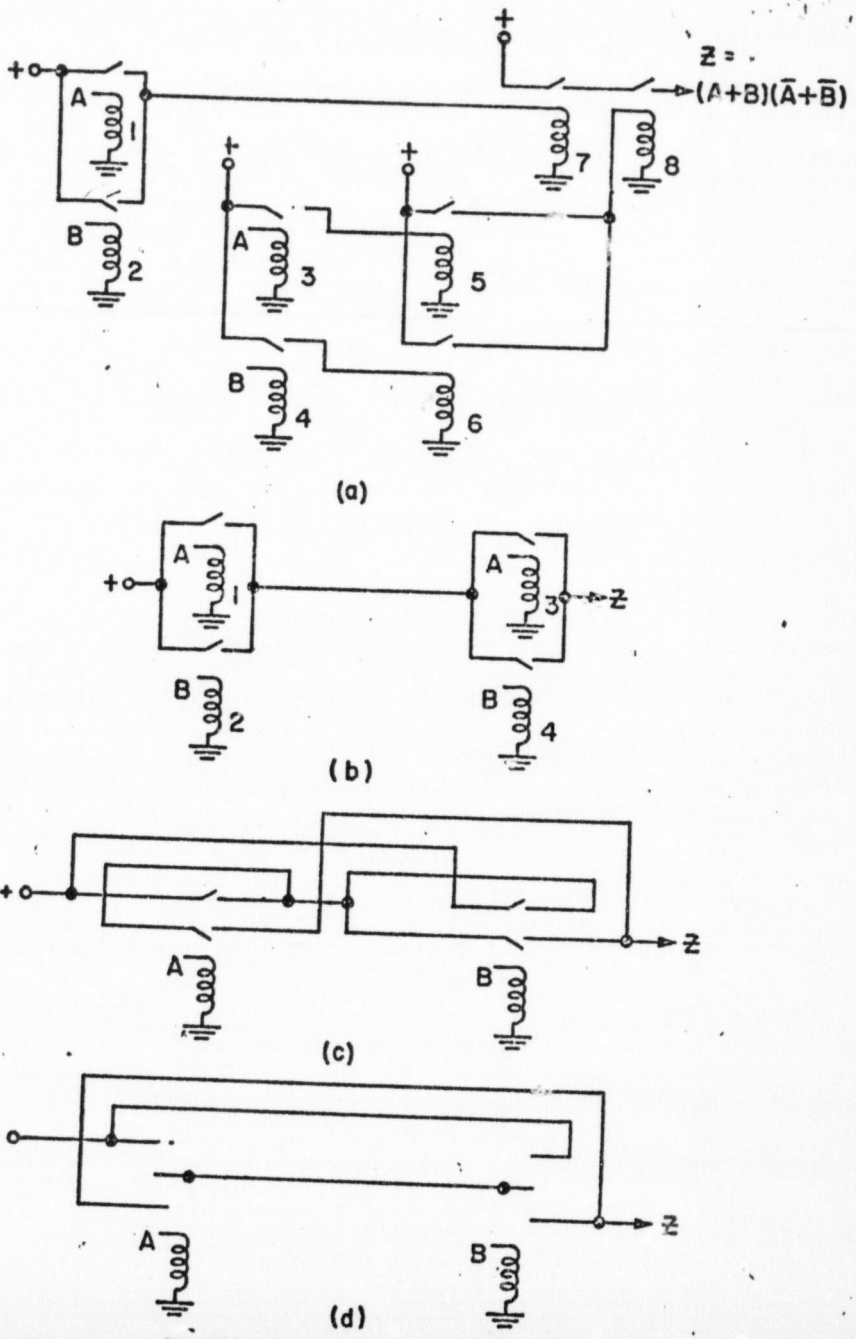

Fig. 2-9. Relay circuits for $(A + B)(\bar{A} + \bar{B})$

arrangements shown in Fig. 2-10 is through the use of normally closed contacts as found on a relay inverter. In Fig. 2-10(a) a normally closed contact on relay F may be used to replace the diode. With this arrangement, if relays A, B, and F are operated, there will be no closed path through the contacts from the supply voltage to the output. However, when C, D, and E are operated there will be a closed circuit through the contacts as desired. The path will be through the normally closed contact on F and then through the contact on E if F is not operated but will be through the normally open contact on F if F is operated. In Fig. 2-10(b) the diode may be replaced by a normally closed contact operated either by D or by E. This method of back circuit elimination is

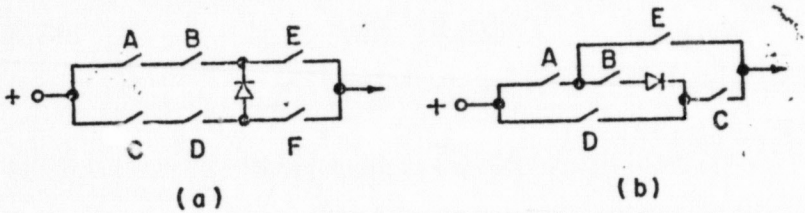

FIG. 2-10. Use of diodes to eliminate back circuits.

sometimes preferable because it is possible to make use of transfer points which utilize both ends of the motion of the relay armature.

There are several further methods by which relays may be adapted to switching circuits. For example, an "or" function is readily formed by placing two windings on the same relay. Two windings on the same relay may be used as an "and" switch if the magnetic force from either winding alone is not sufficient to operate the armature, or they may be used to create a "not" operation by passing current in the windings so that the magnetic fields oppose instead of aid each other. However, multiple-winding relays are, in general, difficult to design for reliable operation as "and" or "not" elements.

Bridge Circuits. The ability of a relay contact to pass current in either direction can sometimes be used to advantage in reducing the number of contacts required to assemble certain types of switching functions. An elementary bridge circuit is shown in Fig. 2-11(a) with coils for actuating the relays omitted. There are four different paths from the supply voltage to the output line, and they may be indicated by the expression,

$$Z = AB + CD + AED + CEB$$

where the current flows through the E contact in opposite directions in the two situations that it contributes to the output signal. Although the

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analysis of switching circuits containing bridge connections is usually not difficult, the finding of a bridge connection to satisfy a given switching function is mostly a matter of cut-and-try, and the practical cases where any bridge connections at all can be used are not particularly numerous.

Other types of switching components, such as the diode switches which have been described, are "one-way" devices, and bridge circuits cannot

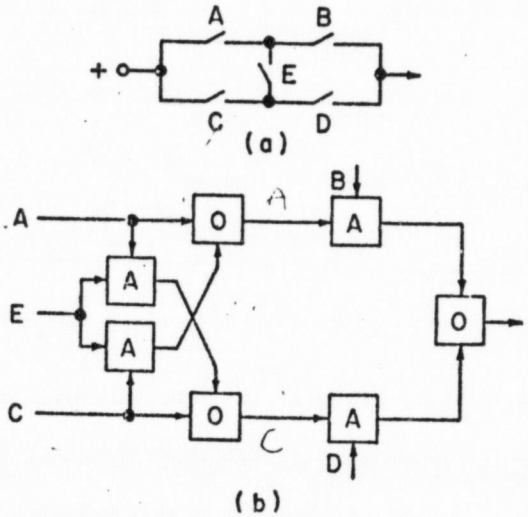

FIG. 2-11. Relay bridge circuit and its diode analogy.

be formed with devices of this type. Of course, it is possible to simulate a bridge circuit as indicated in Fig. 2-11(b), but this particular arrangement could easily be found by writing the switching function as follows:

$$Z = B(A + CE) + D(C + AE)$$

The visualization of this arrangement as a bridge circuit is somewhat artificial; also, it has no advantages as in the case of a relay bridge circuit.

Although the bridge circuit itself is not of outstanding importance as a switching scheme, it is illustrative of a fundamental difference between switching components which involve the controlled opening and closing of "two-way" current paths and those which have the property that signals appearing on the output line from other sources cannot react back on the input lines. Many of the basic principles are the same, but the details of the procedure for determining the most desirable arrangements are quite different in the two cases.

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Inhibitors. Signals on certain input lines will inhibit the passage of signals applied to other input lines by means of a device called an inhibitor. The symbol for an inhibitor is shown in Fig. 2-12, where the use of a semicircle instead of an arrow indicates the inhibitor input. A signal will be present on the output line when a signal is applied to input line, A, unless there is a signal present on B to inhibit it. The output of the inhibitor is therefore $A\bar{B}$. If $A = 1$, that is, if there is always a signal present on A, the function of an inhibitor is no different from that of an inverter.

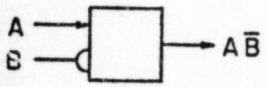

Fig. 2-12. Symbol for inhibitor.

A considerable variety of functions can be built into inhibitors with more than two input lines. For example, two or more "ordinary" input lines can be made to operate as an "or" function where the output will be inhibited by a signal on any one of several inhibitor inputs. Similarly, either the "ordinary" or the inhibitor inputs, or both, can be made to operate in an "and" fashion.

The distinction between inhibitors and inverters is sometimes little more than a matter of viewpoint, although usually there is also a physical difference in the components. Inhibitors are most adaptable to applications where transient pulse-type signals are employed; inverters are more convenient for steady-state signals. In the functional organization of any arithmetic or switching operation, the two types of components are substantially interchangeable. Inverters will be used in the following chapters because, for the most part, steady-state signals will be assumed. Where it is desired to adapt any of the arrangements to pulse-type signals, inhibitors may be substituted in a relatively straightforward manner provided proper precautions are taken with regard to any delays that may be encountered by the signals in passing through the various components. With pulse-type signals it is frequently necessary to introduce compensating delays at appropriate points in a switching network to insure that all input signals arrive simultaneously at any given "and" switch or inhibitor.

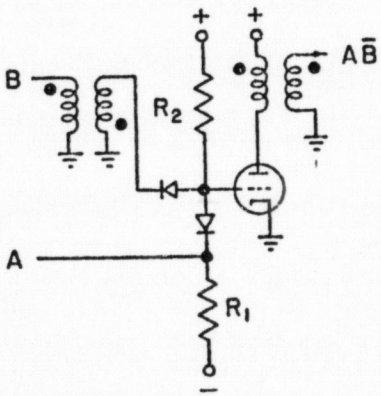

Fig. 2-13. Inhibitor circuit.

A typical inhibitor circuit is shown in Fig. 2-13. Resistors R_1 and R_2 are so chosen that the tube is normally cut off. A positive pulse on in-

put, A, will cause the tube to conduct and create a positive pulse on the output line unless the action is inhibited by a positive pulse on input, B. The transformers are used principally for polarity inversion, although they also serve the useful purpose of shifting the voltage levels of the signals in order that the output from the plate circuit may be used to drive the grid circuit of other tubes.

Feedback Connections. In some cases, useful results may be obtained by feeding the output lines of a switching network back to one or more of the input lines. The most outstanding use of such connections is in the formation of multistable circuits. As an example, consider the circuit

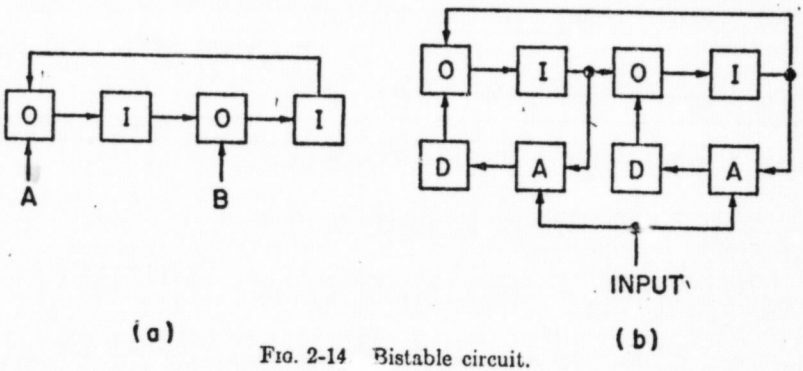

FIG. 2-14 Bistable circuit.

in Fig. 2-14(a) comprised of two inverters and two "or" switches connected so that there is a closed loop in the circuit. Assume that signals are not present on either of the input lines, A and B. If no signal, that is, a 0, is present at the input to the first inverter, a signal (1) will appear at the output of this inverter and will pass through the "or" switch to be applied to the input of the second inverter. The output of the second inverter will therefore be 0. This 0 will be applied to the "or" switch connected in the input circuit of the first inverter and, since a 0 was assumed to be applied to input, A, the circuit will remain in this state indefinitely. When a signal is applied to input, A, even temporarily, the 1 appearing at the input of the first inverter will cause the input to the second inverter to be 0. The output of the second inverter, which will now be 1, will be applied through the "or" switch to the first inverter and will cause the circuit to change to this state. In an analogous manner, a signal applied to input, B, will cause the circuit to transfer back to its original state. Commonly used names for a bistable arrangement of this nature are "trigger" and "flip-flop."

By connecting the two input lines it is possible to form a circuit which will alternate from one stable state to the other upon reception of a

series of pulses applied to the resulting common input line. However, provision must be made to insure that an input pulse will reach only the desired "or" switch. One configuration which will achieve this result is shown in Fig. 2-14(b). Assume that the arrangement is in the state indicated by the 1's and 0's in the figure and that a signal is applied temporarily at the input. The input signal will pass through the right-hand "and" switch and then through the right-hand delay unit (indicated by a block labeled D) to the corresponding "or" switch. If the input signal is terminated by the time the delayed signal arrives at this "or" switch, the input signal will not reach the left-hand "or" switch, and the circuit will change to its other stable state. A subsequent application of a temporary input signal will cause a transfer back to the original state by a similar process. A flip-flop connected in this manner can be used as a binary counter in ways that will be described in more detail in other chapters. Actually, in many practical binary counter circuits (for example, the familiar twin-triode flip-flop), separate components are not needed for all of the various "and," "or," and delay functions; but an analysis of the circuit operation will reveal that each of the required functions is being performed by some means or other.

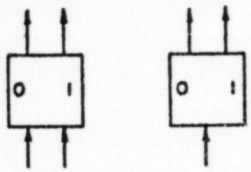

Fig. 2-15. Symbols for bistable devices.

The bistable arrangement of Fig. 2-14 is so frequently used that it is convenient to adopt a special symbol for it, as given in Fig. 2-15. The two stable states can be represented by a 0 and a 1; that is, the device is capable of storing a binary digit. In Fig. 2-15(a) a signal applied to the input line of the left-hand side will cause the bistable device to transfer to the state representing 0 if it is not already in this state. Similarly, a signal applied to the right-hand input line, even temporarily, will initiate a transfer to the state representing 1. The output lines, which are taken from the outputs of the inverters, are used to indicate the state of the device. A signal is always present on one or the other, but not both, of the output lines; and the state is 0 or 1 according to whether the signal is on the left- or right-hand output line, respectively. The symbol given in Fig. 2-15(b) corresponds to the configuration shown in Fig. 2-14(b); a temporary signal applied to the common input line will cause the flip-flop to change to its opposite state regardless of which state it was in originally.

The arrangement shown in Fig. 2-16(a) has three stable states; and the circuit can be caused to exist in any one of the three states by the temporary application of signals to input A, B, or C, respectively. A

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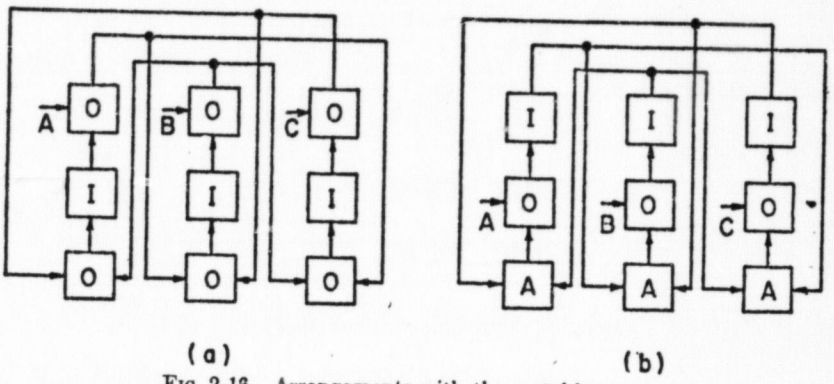
variation is shown in (b). Much more elaborate feedback loops are possible; but, since none are used in the arithmetic circuits to be described in subsequent chapters, the subject will not be discussed further.

It is plausible to apply Boolean algebra to feedback loops including the loops found in individual triggers. Since triggers can be thought of as



(a) (b)

FIG. 2-16. Arrangements with three stable states.

being comprised of elements of switching circuits, it is even conceivable that Boolean algebra techniques could be extended to the point where a whole computer could be represented by a single algebraic expression. However, such an extension does not appear practical, and the use of Boolean algebra will be confined to isolated switching networks without feedback connections.

One other important feedback loop is employed in the formation of a bistable element when pulse-type instead of steady-state signals are used. The arrangement is shown in Fig. 2-17. A pulse applied to the input line, marked 1, will pass through the "or" switch to a delay device (1*D*) which delays the pulse approximately one "cycle" or the time between the "clock pulses," which are a continuous series of pulses at a uniform repetition rate applied to the "and" switch as shown. The initial pulse must be applied at a time relative to the clock pulses such that the delayed pulse arrives at the "and" switch simultaneously with the next clock pulse. The output of the "and" switch then circulates through the loop in the same manner as the initial pulse.

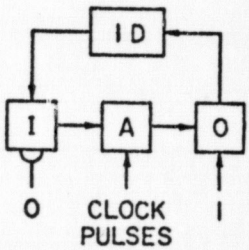


FIG. 2-17. Bistable arrangement employing pulse-type signals.

The purpose of matching the circulating pulse in an "and" switch is to insure that the pulse circulation occurs in step with the remainder of the machine of which this circuit is a part. Although it is not shown,

the loop must also contain an amplifier which will prevent the deterioration of the amplitude and shape of the pulse. In order to terminate the circulation of a pulse in the loop, a pulse is applied at the proper time on the input line marked 0, which is connected to the inhibiting input of an inhibitor. One stable state is therefore represented by the existence of a pulse circulating in the loop, and the other stable state is represented by the nonexistence of a circulating pulse. The output signal may be taken from any point in the loop. Variations in the configuration may be obtained by rearranging the four components in any sequence without affecting the bistable properties.

Other Components. There are many types of components other than diodes, vacuum tubes, and relays which may be adapted to switching circuits. For example, a conducting path between two electrodes in a gaseous tube can be established by applying a high-frequency signal to an electrode which is external to the tube. The input signal turns on or off an oscillator that generates the high-frequency signal, which in turn causes the gas in the tube to be ionized and allow a flow of electrons. Such a device would be a direct analogy to an electromechanical relay except that transfer points would not be possible.

Transistors and magnetic cores are components which are adaptable to computer circuits and with which it is possible to perform switching operations. However, their major application seems to be in amplifiers and storage, respectively; and their role in switching circuits does not appear to be as straightforward as in the case of diodes, tubes, or relays.

The arrangements for performing the various arithmetic operations, as discussed in subsequent chapters, are substantially independent of the components that are used to perform the various switching and storage operations. Some types of components can be made to fit directly in the block diagrams, whereas appropriate modifications in the block diagrams will have to be made for other components; but the principles of operation of the arrangements can remain unchanged.

Chapter 3

SWITCHING NETWORKS

Before proceeding to the arithmetic operations specifically, this chapter will be devoted to switching networks in general. As will be illustrated in subsequent chapters, arithmetic operations are performed in computers largely through the assembling of the computer components to form switching networks of various descriptions. Also, switching networks have application in parts of a computer other than the part which does the actual adding, multiplying, and other operations. In particular, the control portion of a computer is comprised almost entirely of switching networks. Further, switching networks are of interest in many machines and devices such as elevator controls, telephone switchboards, code and cipher machines, and railway signaling systems, which are not computers in the usual sense of the word at all.

In broad terms, a switching network is any digital device to which input signals may be applied and from which output signals may be obtained that are some prescribed function of the input signals. In the examples to be described, it will be assumed that the signals are all two-valued; that is, on a given signal line, a signal either will be present or will not be present. In other words, a signal can be considered as having the value 1 or 0, according to whether it is in existence or not. There is no inherent reason why multivalued signals could not be used, but very little practical use has been made of them because of the difficulties in designing suitable physical components. Reference will be made both to steady-state and pulse-type signals. In most cases either type of signals may be assumed; those instances which require one kind of signal or the other will be apparent from the text or from the nature of the switching network.

Some of the most elementary networks were discussed in the previous chapter. More complicated, in fact even very complicated, switching networks usually may be quite easily assembled in a straightforward

would otherwise result. These definitions apply to both the binary and decimal systems.

Some "computers" perform no function at all other than counting. Many practical examples of simple counting are to be found, and they vary from counters such as those which are used on a printing press to count the number of papers printed to the high-speed electronic counters used for counting nuclear particles. Also, counters may be found as components of more elaborate computers; in particular, counters are used to count and keep track of the "program steps" in a computation.

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Binary Counting. An elementary arrangement for counting in the binary system is shown in Fig. 7-1. The input pulses to be counted

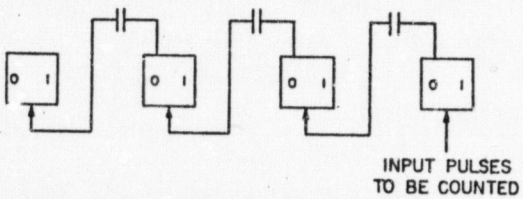

FIG. 7-1. Binary counter, first variation.

are applied to the binary digit counter corresponding to the lowest order. Each time that this digit counter changes from a 1 to a 0 indication, a pulse-type signal is sent to the digit counter in the next higher order. The condenser in the signal line between the two digit counters signifies that the otherwise steady-state output signal is differentiated to yield the desired pulse-type signal when the digit counter changes to 0.

Although the counting speed for the counter arrangement shown in Fig. 7-1 is limited only by the speed of the lowest-order digit counter, the time required for the "carry" to progress through several orders may be objectionably long. For example, when the counter indicates 0111 (decimal 7) and one additional pulse to be counted is received, the digit counters change successively, one at a time, to the indication, 1000 (decimal 8). The time lag required for the counter to present an indication of the new total may be substantially eliminated through the use of the counting arrangement shown in Fig. 7-2. With this arrangement the input pulses are applied simultaneously to all digit counters through "and" switches. If, for any given digit counter, the digit counters of all lower orders are standing on 1's, steady-state signals will be applied to the remaining input lines of the "and" switch and allow the input pulse to pass. The delay devices are needed to prevent the appli-

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cation of a signal to an "and" switch when a digit counter changes from 0 to 1 before the input pulse has terminated. However, the delay devices do not necessarily cause a reduction in the maximum speed of the counter; and, in cases where the action of the digit counters is slow relative to the duration of the input pulses, the delay devices may not be required.

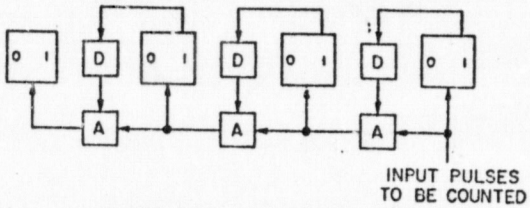

FIG. 7-2. Binary counter, second variation.

The amount of switching required for the carry method in Fig. 7-2 becomes very great when a large number of orders are employed in the counter. A reduction in the amount of switching equipment may be achieved at a moderate cost in carry speed by the method shown in Fig. 7-3. In Fig. 7-3, the input pulse is sent on to the next higher order each time the corresponding counter is standing at 1. The input pulse,

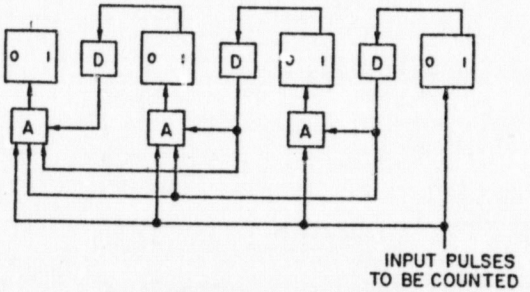

FIG. 7-3. Binary counter, third variation.

therefore, has to pass through a series of "and" switches to reach any of the counters except the first one; but this process may, depending upon the nature of the various components in the counter, be much more rapid than the successive operations of the digit counters as in Fig. 7-1. The delay devices in Fig. 7-3 serve the same purpose as in Fig. 7-2.

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Compromises between the schemes shown in Figs. 7-2 and 7-3 may be achieved, and one such compromise is shown in Fig. 7-4. The first three digit counters and the fourth to sixth, inclusive, digit counters handle the carries as in Fig. 7-2, but the carry is passed between the two groups of three as in Fig. 7-3. The result is that the input pulse has to pass through only three "and" switches to reach the sixth digit counter, and yet no more than three input lines are required for any one "and" switch. The scheme shown in Fig. 7-1 may also be combined with the other schemes in a number of different ways.

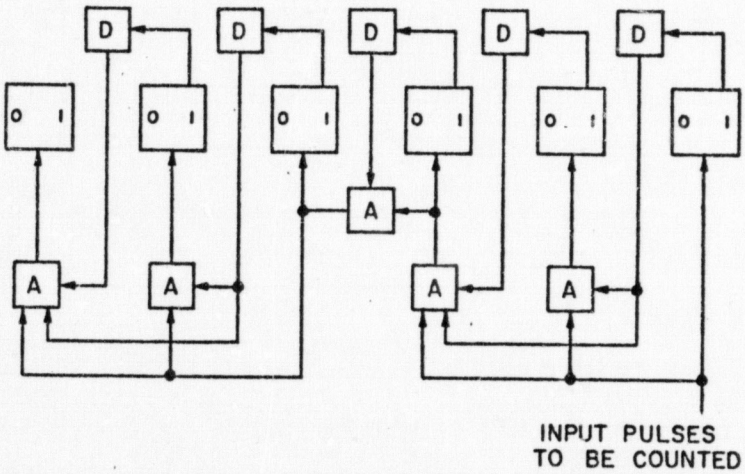

FIG. 7-4. Binary counter compromising features shown in Figs. 7-2 and 7-3.

Half adders may be used to form a binary counter in a variety of ways. One arrangement is shown in Fig. 7-5. The pulses to be counted are applied to one input of the half adder corresponding to the lowest order in the counter. The 1-output of the binary storage device is applied to the other input line of this half adder. The sum output of the half adder is used to turn the storage device to the state representing 1, and the carry output is used to turn the storage device to the state representing 0 as well as to send a carry pulse to the next higher order. From the functional operation of a half adder, it can be seen that the storage device will alternate back and forth between its two stable states upon the reception of input pulses, and a carry pulse will be sent to the next higher order each time it changes to the state representing 0. The digit counters in the next higher order and succeeding orders operate in exactly the same way. The advantage of this arrangement lies

in the fact that the individual binary storage devices have two separate input lines, which may allow more positive transfer action between the two stable states than when bistable devices with a single input line are used. Since the carry portion of each half adder is a simple "and" switch, carry propagation can be made reasonably rapid.

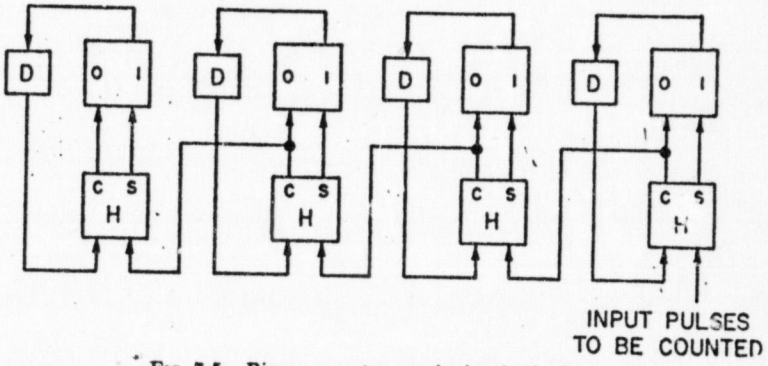

FIG. 7-5. Binary counter employing half adders.

Another counter arrangement employing half adders is shown in Fig. 7-6. Each half adder in combination with a delay element is used as a dynamic binary storage device. The first pulse to be counted will cause a pulse to appear on the sum output of the lowest-order half adder, and this pulse will be returned through the delay element to the other input line of the half adder. The pulse will continue to circulate; that is,

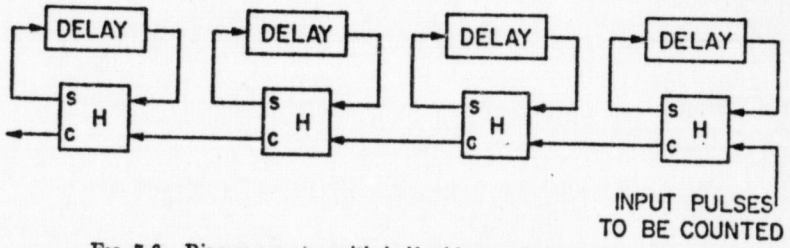

FIG. 7-6. Binary counter with half adders and dynamic storage.

it will be stored. The second pulse to be counted must come at a time when the first stored pulse is entering the half adder, and when two pulses are applied simultaneously to the input lines of the half adder a pulse will appear on the carry output to be sent to the next higher order to start a pulse circulating there. No pulse will appear on the sum output, which will stop the circulation of a pulse in the lowest-

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instance is dependent upon the relative importance of eliminating an inverter or other components. Also, the more subtle points, such as number of levels of switching, the driving power of the input signals, switching speed, and possible nonexistence of certain combinations of input signals must be taken into consideration.

Again, ingenuity on the part of the circuit designer is the primary requirement for finding the most desirable circuit. As an example, the switching function

$$\bar{A}\bar{B}DE + \bar{A}B\bar{C} + \bar{A}\bar{C}DE + AB$$

requires that three of the input variables be available in inverse form. Although it is difficult to find, the expression

$$\overline{A + B\bar{C}}(DE + C) + AB$$

represents the same function, and only one inverter is required.

Multiple-output Switching Networks. Multiple-output networks are, in general, even more remote from the cases for which systematic procedures are known for finding the most desirable arrangements. Of course, if each output signal may be generated by a separate network, all of the remarks made previously can apply. Also, when the networks are limited to pure "and-to-or" or "or-to-and" forms, obvious extensions of the previously described rules and procedures may be used as aids. The rules will help in finding terms or factors which may appear in the expressions for two or more of the output signals and which need not be duplicated in the physical circuitry.

A few practical examples of multiple-output networks are worked out in subsequent chapters. In particular, the full adders described in Chapter 4 on binary addition and subtraction are examples of networks with three input signals and two output signals. In the chapter on decimal addition and subtraction, a decimal adder operating in the 8,4,2,1 code and involving nine inputs and five outputs is worked out in some detail. The method of analysis for this example was also used for deriving the 8,4,2,1 doubler and quintupler described in the chapter on decimal multiplication and division. Since these and other examples meeting various specialized requirements can be found elsewhere in the text, none will be presented here.

Matrices. A certain category of multiple-output circuits deserve special mention because of their wide application. The circuits are known as "matrices" because they are sometimes drawn on paper (or occasionally even constructed physically) in an array of rows and columns which vaguely resemble mathematical matrices. A switching matrix is a switching network which has an output line corresponding to each pos-

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sible combination of input variables; that is, an output signal appears on a separate wire for each elemental term composed of the input variables.

When only two variables are involved, the matrix as shown in Fig. 3-2 is almost trivial. An output signal is obtained on one of four sepa-

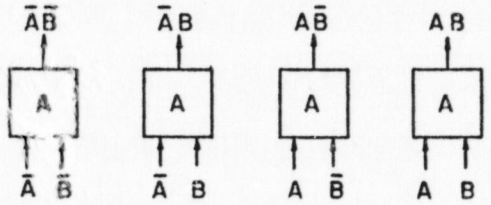


FIG. 3-2. Two-variable matrix.

rate output lines according to the four possible combinations of input variables. When $A = 0$ and $B = 1$, for example, a signal will be present on the line yielding AB, but none of the others.

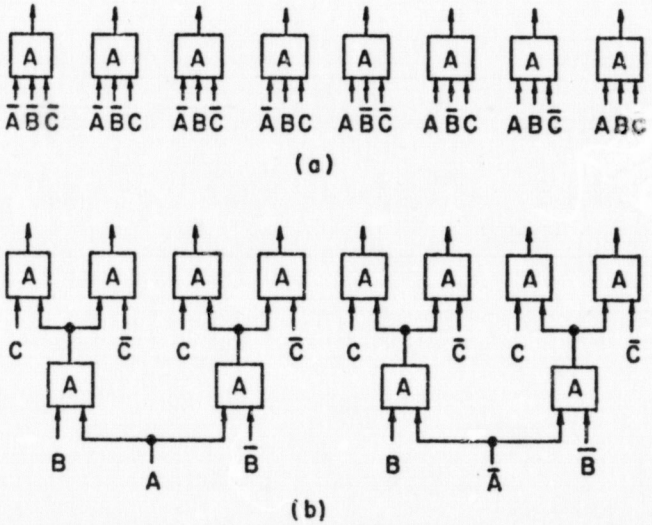


FIG. 3-3. Three-variable matrices.

With three variables, either of the arrangements shown in Fig. 3-3 may be used. In (a) eight 3-input "and" switches are required, whereas in (b) twelve 2-input "and" switches are required. With diode switching of the type described, it happens that a total of 24 diodes is necessary

in either case, although when other types of switching components are employed one or the other of the arrangements may be preferable. The arrangement in (b) is sometimes called a "tree" or a "pyramid." Note that C appears as an input to a relatively large number of "and" switches when compared with B or A. This unequal loading of the input signals may be a disadvantage. The loading may be equalized somewhat by interchanging the B and C inputs in either the right-hand half or the

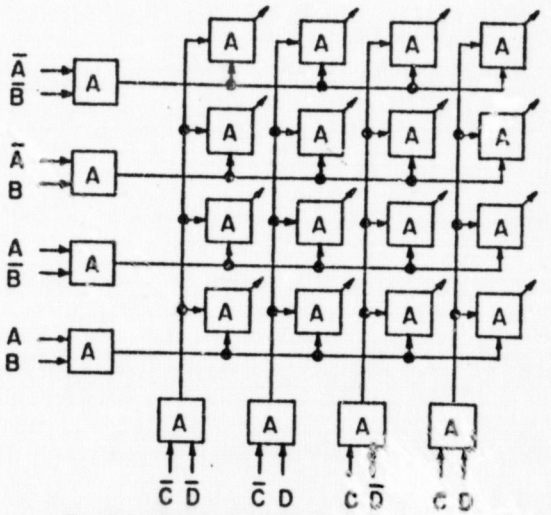
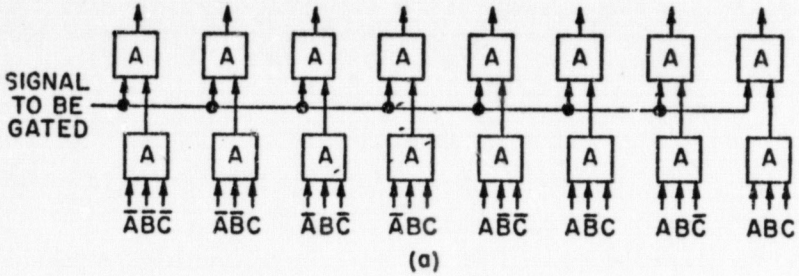


FIG. 3-4. One form of four-variable matrix.

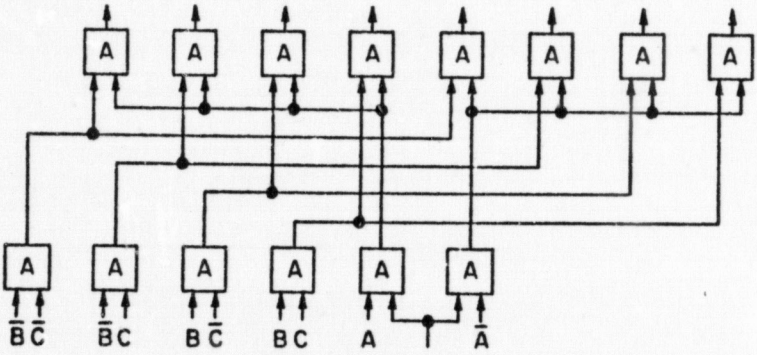
left-hand half of the figure; it happens that this change does not affect the output functions.

For four or more input variables, obvious extensions of Fig. 3-3 may be made, but the number of diodes required for the two arrangements are no longer the same. With n input variables, $n2^n$ diodes are required when the first type of arrangement is used, and $2^2 + 2^4 + \cdots + 2^{n+1}$ diodes are required for the "tree." The type of matrix which is most conservative in components, at least when diodes are used, is shown for four variables in Fig. 3-4. The variables are divided into two groups with one group including A and B and the other group including C and D. Four intermediate signal lines are derived from each group, and then these are combined in a set of sixteen two-input "and" switches which will yield a signal on one of sixteen output lines.

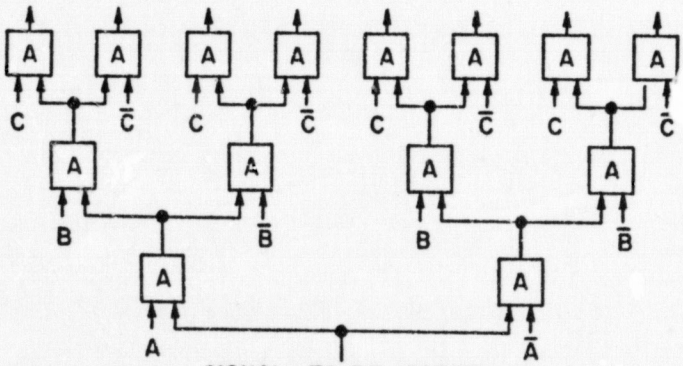
With five input variables, an analogous array is used to minimize the number of components. In this case one group would contain two vari-



(a)



(b)



(c)

FIG. 3-5. Three-variable "gating" matrices.

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ables; the other would contain three with eight intermediate lines formed according to either of the arrangements shown in Fig. 3-3. The thirty-two output lines would then be obtained with a four-by-eight array of two-input "and" switches.

In general, with n input variables, the variables are divided into two groups with $n/2$ variables in each group when n is even and with $(n+1)/2$ and $(n-1)/2$ variables, respectively, when n is odd. Each group is divided into subgroups in a similar manner, and the subdividing is continued until all subgroups contain either 2 or 3 variables. The 2-variable and 3-variable subgroups are applied to switching networks of the types shown in Figs. 3-2 and 3-3, respectively. The subgroups are then combined with appropriate arrays of 2-input "and" switches.

In some applications the output signals from a matrix are used directly as implied in the preceding discussion. In other applications the matrix is used to "gate" an external signal (such as series of pulses) onto one of a multiplicity of signal lines. For three input variables, probably the most obvious way of accomplishing the desired result is shown in Fig. 3-5(a). Since the signal to be gated may be considered as another input to the switching network as a whole, a number of variations in the matrix are possible. Two variations are shown in Fig. 3-4(b) and (c). Either of these arrangements requires less components than (a), but they have the disadvantage that the signal to be gated must pass through more "and" switches in succession, and with some types of components the delay might be excessive.

When a matrix involving four or more variables is necessary for the gating of the signal, extensions of the schemes shown in Fig. 3-5 may be readily worked out. One arrangement with four matrix variables, which combines the features of Figs. 3-4 and 3-5(c), is given in Fig. 3-6. When choosing the most desirable arrangement for any given application, it should be noted that in some arrangements certain of the "and" switch inputs must pass the signal being gated, whereas others need to respond only to the matrix switching signals. It may be that an "and" switch which must pass the gated signal is much more expensive than the other "and" switches. For this reason, the simple minimization of "and" switches is not necessarily the best criterion for judging the various possible network configurations.

Another important application of matrices is the selection of a signal from one on several different lines and applying this signal to a single output line. In this case the multi-output features of matrices substantially disappear, and the notation used earlier in the chapter for single output circuits may be applied directly. For selecting one of eight sig-

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numbers. Actually, slightly more equipment than two half adders per order is required, because a carry signal may be received from either of the half adders, and provision must be made for transmittal of either one of these two carries to the next higher order. A block diagram of the equipment necessary for the addition of two binary numbers by this process is shown in Fig. 4-1. The two numbers to be added are $X = \cdots X_3X_2X_1$ and $Y = \cdots Y_3Y_2Y_1$ to produce a sum, $S = \cdots S_3S_2S_1$. The half adders are so labeled, and the "or" switches for "mixing" the

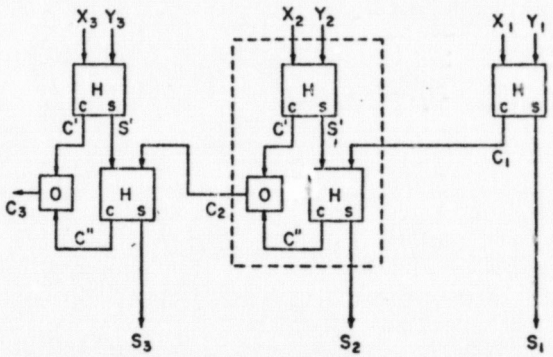

FIG. 4-1. Binary addition, first variation.

carries are indicated by blocks labeled O. The sum output of the first half adder of each order is designated as S' to distinguish it from the correct sum, S, which is the sum output from the second half adder. The carry outputs from the first and second half adders are similarly labeled C' and C''. Note that from the rules of binary addition it is impossible to have carry signals simultaneously from both half adders in an order. This statement can be understood by observing that, for C' to be 1, it is necessary that the corresponding digits of both X and Y be 1, in which case S' is 0 and therefore C'' will be 0. The carry which is sent to the next higher order is therefore comprised of C' or C''. The "or" function is executed so ingeniously in some circuits and devices that its existence can easily escape notice, but in the design of a binary adding device it must not be forgotten.

A variation in the method of binary addition may be obtained by adding the carry to the digit of one of the numbers and then adding the digit of the other number to the resulting sum. A block diagram

of this method is shown in Fig. 4-2. As before, the carry to be transmitted to the next higher order is C' or C''. Mathematically, the difference between the arrangements shown in Figs. 4-1 and 4-2 is trivial, but from an engineering viewpoint there is an important difference which occurs in the speed with which a carry may be propagated through the orders. Consider the example where $X = 00001$ and $Y = 01111$. A carry will occur in the lowest order, which, when added to the second order, will produce a carry there; the carry in the second order will produce

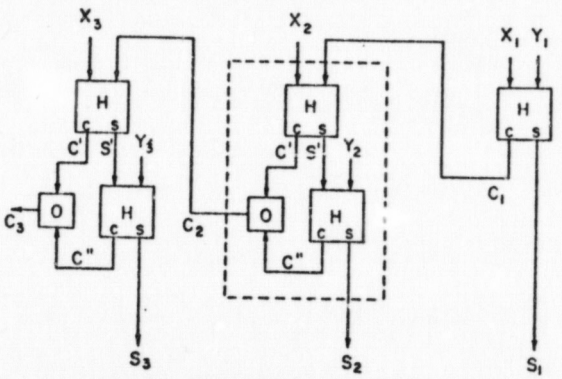

Fig. 4-2. Binary addition, second variation.

a carry in the third order, and so on. With the arrangement shown in Fig. 4-1, the carry must proceed through only one half adder per order, but in Fig. 4-2 it must proceed through both half adders in each order and is therefore slower. Since there are no particular advantages for the arrangement shown in Fig. 4-2, it will not be discussed in any further detail.

Half Adder. From Table 4-I it may be deduced that the Boolean algebra expressions for simple binary addition (the function performed by a half adder) are

$$\text{Sum} = X\bar{Y} + \bar{X}Y$$

$$\text{Carry} = XY$$

where X and Y are the input signals of a given order in the augend and addend. The subscripts on X and Y are omitted for simplicity of notation. The determination of these expressions from the table is straight-

ITEM	TITLE	DWG. NO.	REVISION LETTER	TEST METHOD NO.	REVISION LETTER
1	ODDS REGISTER	DG479	A B		
2	ODDS FUNCTION TABLE	480	A		
3	ODDS FUNCTION TABLE	481	A		
4	PLACE ACCUMULATOR	482	A		
5	ACCUMULATOR CONTROL	483	A B		
6	DATA INPUT	484	A B C		
7	DATA INPUT	485	A B		
8	MEMORY CIRCUITS	486	A		
9	ACCUMULATOR CONTROL	487	A B C		
10	WIN POOL ACCUMULATOR	488	A B		
11	WIN ACCUMULATOR	489	A		
12	SHOW ACCUMULATOR	490	A B		
13	ODDS OUTPUT BUFFER	491	A		
14	MEMORY ADDRESS COUNTERS	492	A B		
15	UNIT ADDER	493	A B C		
16	MEMORY & ADDRESSING CON	494	A B C		
17	CLEAR & INPUT CONTROLS	495	A B C		
18	LISTER CONTROLS	496	A B C D		
19	LISTER CONTROLS	497	A B		
20	LISTER OUTPUT	498	A B		
21	LISTER OUTPUT	499	A		
22	LISTER OUTPUT	500	A		
23	LISTER OUTPUT	501	A		
24	ODDS OUTPUT DISPLAY DR.	502	A		

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DRAWING LIST

JOB NO. 4726

SYSTEM: ROOSEVELT

MODEL NO:

PAGE: 1 OF: 5

LB-L 388

DEFENDANT'S EXHIBIT NO. 1119

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ITEM	TITLE	DWG. NO.	REVISION LETTER	TEST METHOD NO.	REVISION LETTER
25	HORSE NO. DISPLAY DRIVER	DG503	A		
26	PLACE OUTPUT DISPALY DR.	504	A		
27	SHOW OUTPUT DISPLAY DR.	505	A		
28	WIN OUTPUT DISPLAY DR.	506	A B		
29	MEMORY DATA CIRCUIT	507	A		
30	POOL ADDER	508			
31	ODDS COMPUTATION CONT.	537			
32	ACCUMULATOR CONTROLS	551	A B C		
33					
34					
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ECO	ITEM NO.	APPR	DATE

ECO	ITEM	APPR.	DATE

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DIGITRONICS
ALBERTSON, NEW YORK

DRAWING LIST

JOB NO. 4726

SYSTEM: ROOSEVELT

LB-L 500

MODEL NO:

PAGE: 2 OF: 5

ITEM	TITLE	DWG. NO.	REVISION LETTER	TEST METHOD NO.	REVISION LETTER
49	FRAME 1D	DK305-4	A B C		
50	1E	5	A B C		
51	1F	6	A B C		
52	MEMORY 1H	7	A B C		
53	MEMORY 1I	8	A B C		
54	FRAME 1K	9	A B C		
55	1L	10	A B C		
56	1M	11	A B C		
57	2A	12	A B C		
58	2B	13	A B C		
59	2C	14	A B		
60	2D	15	A B		
61	2E	16	A B		
62	2F	17	A B		
63	2H	18	A B C		
64	2J	19	A B C		
65	2K	20	A B C		
66	2L	21	A B C		
67	2M	22	A B C		
68	3A	23	A		
69	3B	24	A		
70	3C	25	A		
71	3D	26	A		
72	3E	27	A		

ECO	ITEM NO.	APPR	DATE

ECO	ITEM	APPR.	DATE

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DRAWING LIST

JOB NO. 4726

SYSTEM: ROOSEVELT

MODEL NO:

LB-L 305

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ITEM	TITLE	DWG. NO.	REVISION LETTER	TEST METHOD NO.	REVISION LETTER
73	FRAME 3F	DK305-28	A		
74	3H	29	A		
75	3J	30	A		
76	3K	31	A		
77	3L	32	A		
78	3M	33	A		
79	POWER WIRING RK 3	34	A		
80	FRAME 4A	35	A B		
81	4B	36	A		
82	4C	37	A B		
83	POWER WIRING RK 1	38	A		
84	POWER WIRING RK 2	39	A		
85	POWER WIRING RK 4	40	A B		
86	POWER INTERCONNECTION	42	A B		
87	POWER CONTROL WIRING	43	A		
88	PATCHBOARD WIRING	44	A		
89	PLUG WIRING	45	A		
90	PLUG WIRING	46	A B		
91	PLUG WIRING	47	A		
92	MODULE LOCATION	48	A		
93	CONTROL PANEL WIRING	49			
94	SWITCH BOX INTERNAL WIR.	51	A		
95	INTERNAL WIRING ON MOD.	52	A		
96	INTERNAL WIRING IN MOD.	53	A		

ECO	ITEM NO.	APPR	DATE

ECO	ITEM	APPR.	DATE

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ALBERTSON, NEW YORK

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SYSTEM: ROOSEVELT

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MODEL NO:

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ITEM	TITLE	DWG. NO.	REVISION LETTER	TEST METHOD NO.	REVISION LETTER
97	PATCHBOARD WIRING	DK305-54	A		
98	BETTING BOOTHS	" " 55			
99	CONTROL PANEL	CK305-56			
100	CONTROL PANEL(INTERNAL)	DK305-57	A B		
101	CONTROL PANEL	" " 58	A		
102	BETTING SWITCH CIRCUITS	" " 59	A		
103	TICKET ISSUE MACHINE	" " 60			
104	TICKET ISSUE MACHINE	" " 61			
105	TICKET ISSUE MACHINE	" " 62			
106	TICKET ISSUE MACHINE	" " 63			
107	POWER SCHEMATIC	DH359			
108					
109					
110					
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120					

ECO	ITEM NO.	APPR.	DATE

ECO	ITEM	APPR.	DATE

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SYSTEM: ROOSEVELT

LB-L 305

MODEL NO:

PAGE: 5 OF: 5

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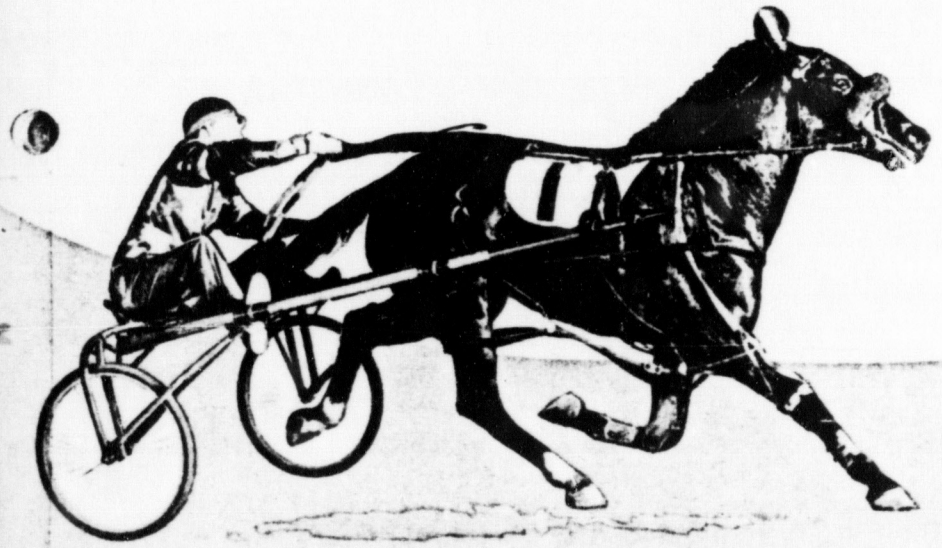
A871

WESTBURY ELECTRONIC CORP.

DEFENDANT'S EXHIBIT
NO. 670-119

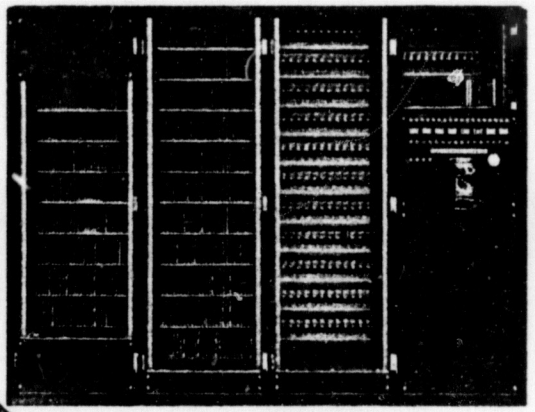
presents the world's first

ALL-ELECTRONIC TOTALIZATOR



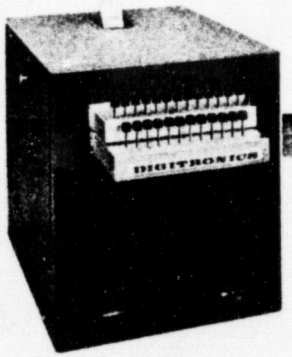
THIS ALL-ELECTRONIC PARI-MUTUEL SYSTEM CONSISTS OF:

TOTE CENTER DISPLAY PANEL

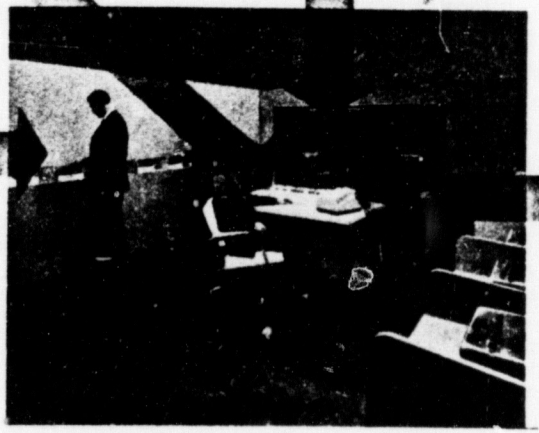


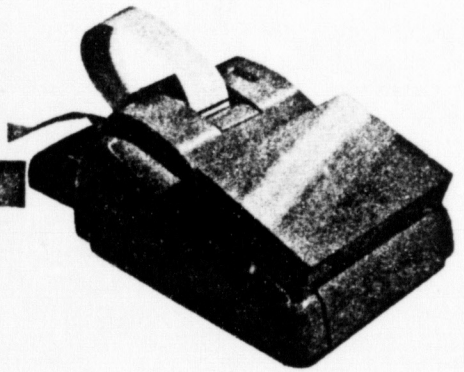
SCANNER AGGREGATOR ODDS COMPUTER PAYOFF COMPUTER

INFIELD TOTE DISPLAY BOARD



TICKET ISSUING MACHINES





PRINTOUT FACILITIES

This All-Electronic Pari-Mutuel System consists of a complete tote center, ticket issuing machines, an infield tote display board, and other remote display boards around the track. The tote center consists of a scanner, aggregator, odds computer, payoff computer, a tote center display panel, and printout facilities. The function of each of these elements will be explained in detail at a later point.

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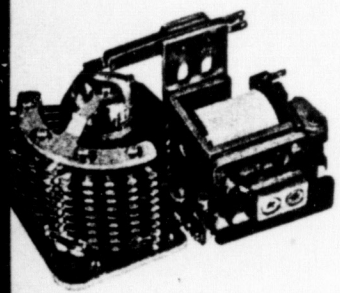
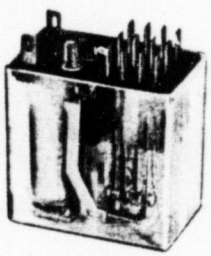
THIS SYSTEM IS CONSTRUCTED ENTIRELY OF ELECTRONIC DIGITAL EQUIPMENT

ELECTRONICS VS. ELECTRO-MECHANICAL

ELECTRO MECHANICAL – NUMEROUS MOVING PARTS



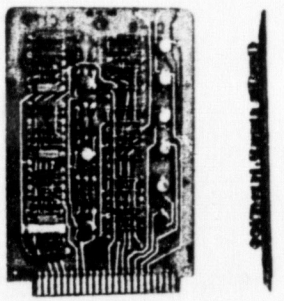
ELECTRO-MECHANICAL STEPPING SWITCH



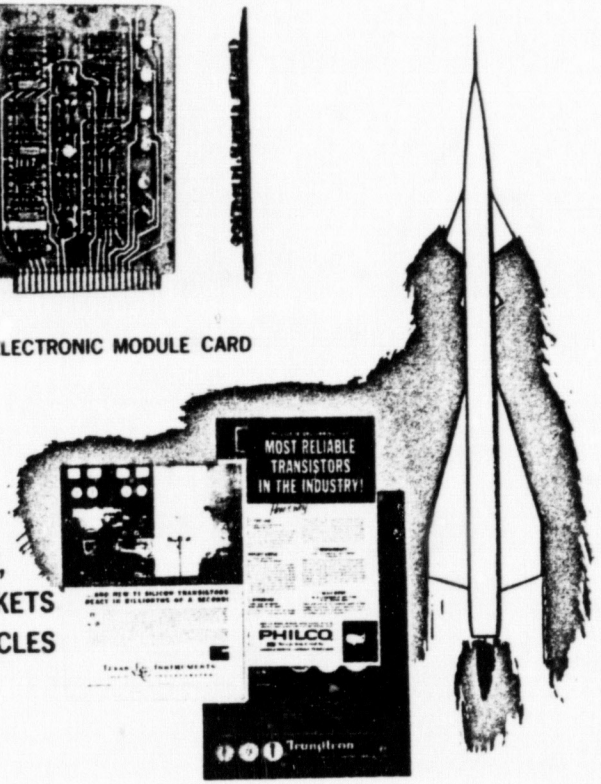
ELECTRO-MECHANICAL RELAY

ELECTRONICS – NO MOVING PARTS

FRONT SIDE



ELECTRONIC MODULE CARD



ALL-SOLID STATE, AS USED IN ROCKETS AND SPACE VEHICLES

Totalizators presently in use at race tracks throughout the world are based on electro-mechanical equipment. This type of equipment is large and bulky, and has a great number of moving parts, including stepping switches and relays. **The moving parts constitute a constant source of trouble.** They generate friction, wear out and have to be replaced, causing breakdowns and possible interruption of service. In the **All-Electronic Totalizator,** all totalizing and calculating is accomplished with pure, electronic digital solid-state equipment, with **no moving parts.** The elements are small and compact. They utilize electronic module cards, the same as those used in rockets, satellites, and space vehicles. They offer compactness, durability and dependability — virtually never wear out.

THE ALL-ELECTRONIC TOTALIZATOR IS SUPERIOR TO ELECTRO-MECHANICAL EQUIPMENT

- MORE ACCURATE (no human calculations)
- GREATER SPEED
- MORE RELIABLE (no moving parts)
- MORE FLEXIBILITY
- LOWER MAINTENANCE COSTS (reflected in lower price)
- LESS EXPENSIVE
- OCCUPIES LESS SPACE (has greater mobility)

The Tote Board Lights Up an Error

There WAS something new under the lights at Roosevelt Raceway last night—an error in calculation — and the mistake cost the track $10,057.25.

The expensive boo-boo occurred after the third race when the win payoff on longshot (16.35 to $1) Taffy Hanover was flashed on the board as $34.70. Seconds later, it was changed to $31.20, a difference of $3.50 on every 2 ticket held by the fortunates among the crowd of 19,815.

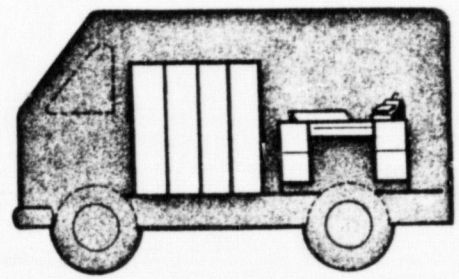
The judges announced the error had occurred in the calculating room. Because some payoffs on the bigger price had already been made in the brief time it took to make the correction, the track had to pay off every ticket holder on the larger sum.

The total win pool on the third race was $105,597.

Asked what might happen to the clerk who missed up on his arithmetic, a track spokesman said, "Nothing. The man who checks on the party of the first part was equally at fault."

Al Weil, RR prexy, recalled that once before a 20-cent higher price had been flashed on the show price on the board, but the error was caught before anyone had been paid. COHEN.

New York Post — May 25, 1961



The All-Electronic Totalizator has many features which are superior to the electro-mechanical equipment now in use.

1. It is far more accurate because none of the calculations are done by humans. With an electro-mechanical system, the odds are computed by machines, but the payoff calculations are done by humans. Recently Roosevelt Raceway suffered a loss of more than $10,000 due to an error in arithmetic by one of the clerks. This couldn't happen with the All-Electronic Totalizator because all the calculations are done electronically by the computers.
2. It offers far greater speed. Electronics function much faster than electro-mechanical equipment. All transactions are reported instantly. All calculations are done instantly. As a result, daily-double windows now can be held open until the very last moment before a race starts.
3. It is far more reliable. There are no moving parts to break down.
4. It offers more flexibility. The denomination of windows can be changed from the tote center. Daily-double windows can be changed that way. It also copes with late scratches.
5. It offers lower operating costs. Since all the elements are solid-state, and there are no moving parts, maintenance costs are lower.
6. It is less expensive. With the compactness of solid-state components, less equipment is required. There is no need for the hundreds of stepping switches and relays. The net result is lower cost.
7. It offers greater mobility. Since there is less equipment, it occupies less space and increases mobility. The system can be installed in a trailer and moved easily from track to track.

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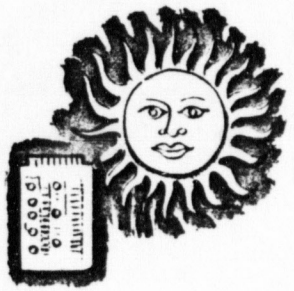
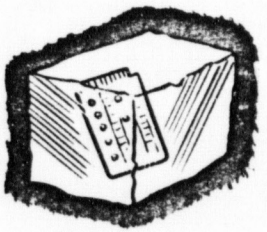
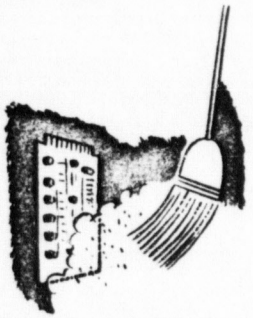
SUPERIOR ALSO BECAUSE IT IS LESS SENSITIVE TO:



• HEAT

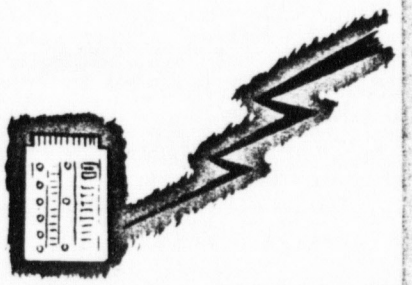
COLD •

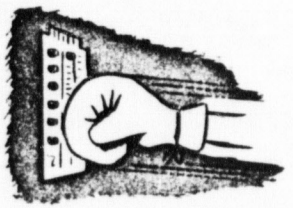




• SAND and DIRT

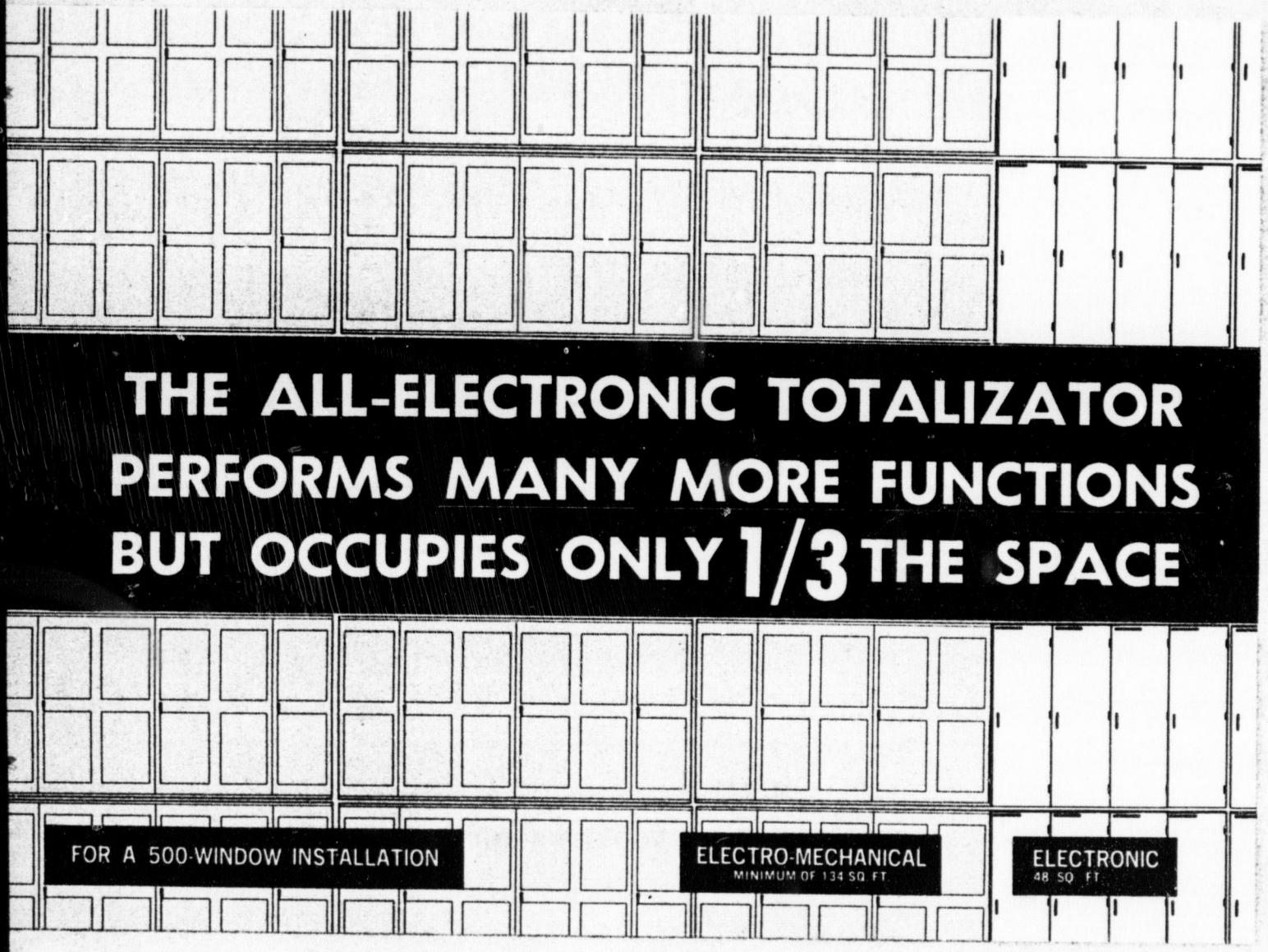
ELECTRICAL DISTURBANCES •





• IMPACT (solid-state)

The All-Electronic Totalizator is superior to electro-mechanical equipment because it is less sensitive to the elements. Solid-state components are less sensitive to heat, cold, sand and dirt. There are no moving parts to overheat or freeze. There are no moving parts to malfunction when sand and dirt seep in. Solid-state components are less sensitive to electrical disturbances. They are less sensitive to movement and impact. Lack of sensitivity to all of these factors is one of the reasons solid-state components are used in rockets and satellites.



Although the All-Electronic Totalizator performs many more functions than the electro-mechanical system, it occupies only one-third the space. The use of solid-state electronic components, such as module cards, diodes, transistors and magnetic memory cores to replace large, bulky stepping switches and other electro-mechanical equipment, results in a considerably more compact system. For example, the electro-mechanical equipment needed for a 500-window track requires a minimum of 134 square feet of space. For the same installation, the All-Electronic Totalizator occupies only 48 square feet — two-thirds less space.

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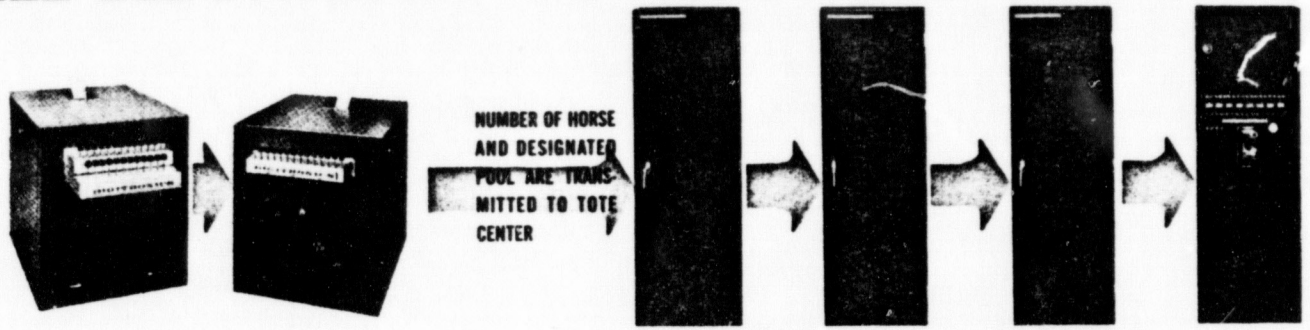
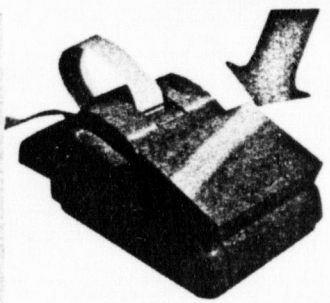
HERE IS WHAT THE ALL-ELECTRONIC TOTALIZATOR DOES:



MAGNETIC MEMORY CORE — THE HEART OF THE SYSTEM



PRINTS OUT:

a) NUMBER OF TRANSACTIONS FOR EACH HORSE IN EACH CATEGORY OF WAGER

b) TOTALS WAGERED ON EACH HORSE FOR EACH CATEGORY

c) NUMBER OF WAGERS ON EACH HORSE AT EACH WINDOW

AFTER EACH RACE:

- COMPUTES THE PAYOFF
- COMPUTES POSSIBLE DAILY-DOUBLE PAYOFFS
- AND FINAL DAILY-DOUBLE PAYOFF
- CALCULATES AMOUNT DUE TO TRACK AND STATE
- ALLOWS FOR "BREAKAGE"

Although the function of each piece of equipment will be depicted and explained at a later point, here is the flow of data and activity provided by the All-Electronic Totalizator. As regular and daily-double wagers are made at the windows, tickets are issued by the ticket issuing machines. Before a ticket is issued, the transaction is automatically transmitted to the tote center. It is only when the wager has been registered that the ticket emits from the machine. The data consists of the amount of the wager, the number of the horse, and the designated pool. In the tote center, the data is entered into the fully electronic memory and is checked for accuracy.

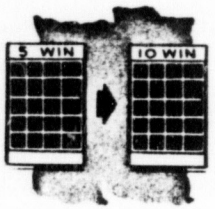
It then goes into the aggregator, which accumulates all transactions. From there it goes into the odds computer. The computer translates all the transactions into dollars and calculates the probable odds. The odds are then transmitted to and displayed on the tote center display panel, the infield tote display board, and the remote display boards around the track. For each race there is a continuous display of the total of the win, place and show pools, and of the individual horse totals for each pool. The display cycles every 70 seconds; it takes about one second to complete each updating. On the infield display board, odds and totals for all horses, as well as the totals for all pools, are on display simultaneously and continuously. Following the completion of the first race, possible payoffs for the daily-double are displayed.

After windows are closed, the information is then printed out on paper. This includes the number of transactions for each horse in each category of wager, the totals wagered on each horse for each category, and the number of wagers on each horse at each window.

At the conclusion of each race, the payoff computer calculates the payoff. It computes the possible daily-double payoffs and the final daily-double payoff. It calculates the amount due to the track and the state, and allows for breakage . All this, from the time a wager is placed until all calculations are completed at the end of a race, is done electronically — and the heart of the entire system is the tiny magnetic memory core. It is this tiny element which permits the computers and other equipment to function so rapidly, accurately and dependably. It is minute in size, but gigantic in its accomplishments.

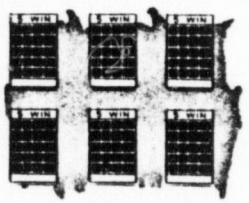
THE TOTE CENTER ALSO:

COPES WITH SCRATCHES, DEAD HEATS AND OTHER VARIABLES



REDESIGNATES WINDOWS
(from $5 to $10, etc.)

PERMITS DAILY-DOUBLE WAGERS
TO THE LAST MINUTE



HANDLES EIGHT 1,000-WINDOW TRACKS
AS EASILY AS ONE 10-WINDOW TRACK

BEST COPY AVAILABLE

Although we have followed the flow of data and activity provided by the All-Electronic Totalizator, the tote center provides additional facilities worthy of mention. From the tote center, windows can be redesignated — a $5 window can be changed to a $10 window, a $2 window to a $5 window, etc. Windows can be made inoperative from the tote center. Because of the speed in handling transactions, the tote center permits daily-double windows to remain open until the very last second before a race starts.

The tote center also copes with scratches, dead heats and other variables. In the event a horse is scratched, a control in the tote center instructs the ticket issuing machines not to accept a bet on the scratched horse. The operation of the scratch button with a horse involved will remove the total pool involving that horse on the probable odds computation or the payoff computation. In the daily-double operation of the scratch, controls automatically set up the consolation pool, if desired. This pool consists of all money wagered on the scratched horse in the second race, in combination with each winning horse in the first race.

The tote center is designed to handle all size tracks, from the smallest to the largest. It can handle eight 1000-window tracks as easily as one 10-window track, without any loss in speed.

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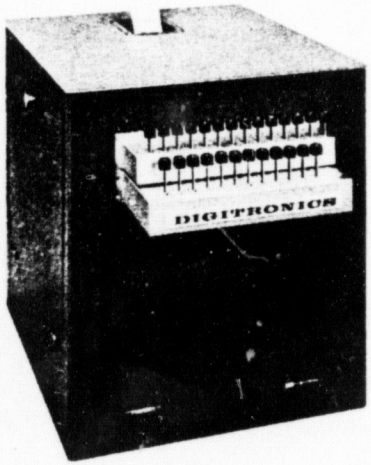
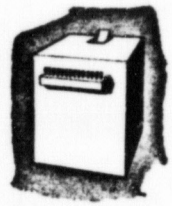
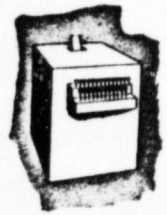
HERE IS WHAT THE TICKET ISSUING MACHINES DO:

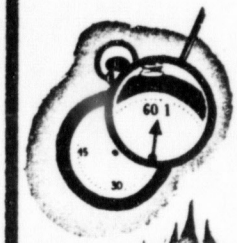




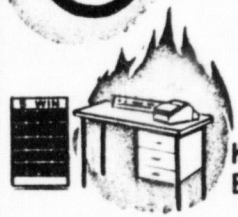
REPORT ALL WAGERS AND ISSUE ALL TICKETS



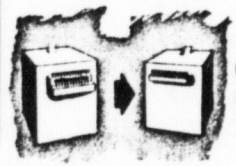
REPORT AND ISSUE DAILY-DOUBLE WAGERS AS EASILY AS REGULAR WAGERS



TAKE SLIGHTLY MORE THAN ½ SECOND TO ISSUE TICKET AND REPORT TO TOTE CENTER REGARDLESS OF HEVY WAGERING TRAFFIC



KEEP RECORDS FOR EACH WINDOW FOR EACH RACE — FOR ALL CONTINGENCIES



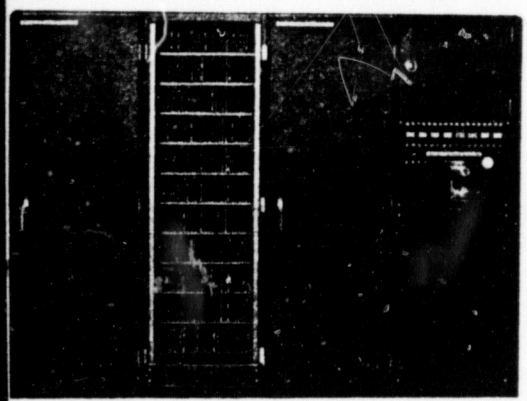
A DAILY-DOUBLE OR QUINIELLA MACHINE MAY BE CONVERTED TO REGULAR WAGERING

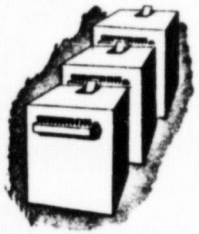
The ticket issuing machines are designed to function with the All-Electronic Totalizator. Basically, they report all wagers and issue all tickets. They report and issue tickets for daily-double wagers as easily as for regular wagers. The machines allow for regular wagers, the sale of tickets for win, place and show positions, in any size denominations, including $2, $5, $10, $50 and $100, plus the combinations of $4, $6, and $10. For daily-double wagers, the machines allow for the sale of daily-double tickets for $2, $10 wagers, etc.

The machines are fast: it takes each machine slightly more than one-half second to report the details of the transaction to the tote center and issue a ticket regardless of how many wages are being made. All machines, both regular and daily-double, are scanned four times every second. This applies from the smallest installation to installations of up to 1000 windows. The machines also may be converted from daily-double or quiniella operations to win, place or show.

In addition to reporting transactions to the tote center, a record is kept of all transactions for each race, for each ticket issuing machine for each window. For the regular machines, a counter is used to record the total number of wagers passing through the machine for each race. For daily-double machines, a perforated paper tape is punched to record each transaction. If something were to destroy the entire tote center, wagering could continue and records of all transactions could be obtained to permit hand calculation of the payoff.

HERE IS WHAT THE AGGREGATOR DOES:

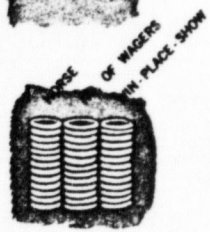




ACCEPTS ALL DATA FROM TICKET ISSUING MACHINES

REFUSES TO ISSUE TICKETS ON UNACCEPTABLE WAGERS (such as scratches, etc.)

STORES ALL DATA IN MAGNETIC MEMORY CORES



KEEPS ALL DATA BY HORSE, DENOMINATION OF WAGER, POOL etc.

DUPLICATES RECORDS KEPT FOR EACH WINDOW (OPTIONAL)

The basic function of the aggregator is to accept all the details of all transactions from the ticket issuing machines. It accumulates the number of wagers for each denomination, for each horse, and (in the case of regular wagers) for each pool. This is subject to a four-way check, since it is accomplished by two computing sections, each of which checks against itself and against the other. It accumulates the number of wagers for each horse at each selling machine. This is subject to a two-way check, since it does each operation twice and thus checks against itself. It will reject unacceptable wagers. For example, if a wager is placed on a horse which has been scratched, it will not allow the ticket issuing machine to issue a ticket.

As the aggregator accepts data from the ticket issuing machines, it stores it in the magnetic memory cores. In maintaining all this data, it duplicates the records kept at each window by the ticket issuing machines (optional).

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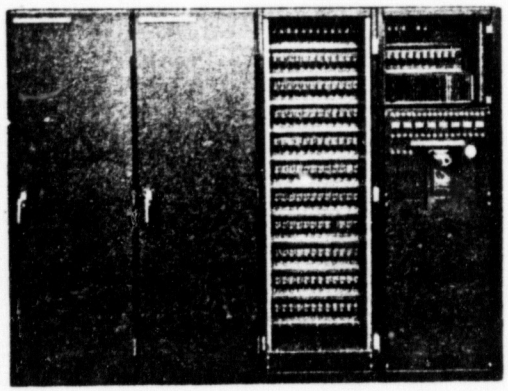
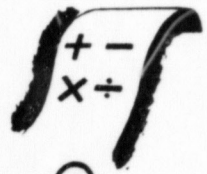
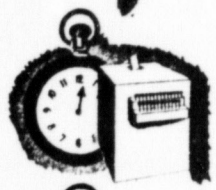
HERE IS WHAT THE ODDS COMPUTER AND PAYOFF COMPUTER DO.

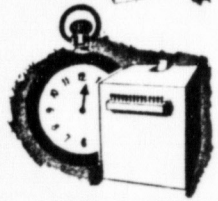




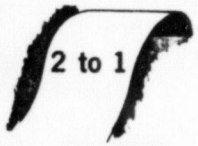
CALCULATE ALL TOTALS



CALCULATE DAILY-DOUBLES INSTANTLY



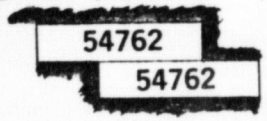
CALCULATE REGULAR RACES INSTANTLY



CALCULATE PROBABLE ODDS INSTANTLY

CALCULATE PAYOFF TO NICKEL OR DIME

SPECIAL CHECKING CODE IS USED TO INSURE ACCURACY



TWO COMPUTERS CHECK EVERY STEP AND COMPARE ALL FIGURES AND TOTALS

The basic function of the computers is to do all the required calculations, to do them quickly, and to do them accurately. As the computation is done, the wagers are translated into dollars. The computers calculate all the totals for daily-double wagers instantly. They calculate all the totals for regular race wagers instantly. They calculate probable odds instantly. A probable odds computation is performed once every 70 seconds. At the conclusion of each race, the computers calculate the public payoff adjusted to the nickel or dime. The computation of the payoff is made available within 15 seconds after the order of finish is punched into the central control units; for the daily-double, the computation of probable payoffs, after completion of the first race, is made available in about 10 seconds. Upon completion of the second race of the daily-double, the daily-double payoff, rounded down to the nearest dime, is made available.

To insure accuracy in the transmission of the data from the ticket issuing machines to the tote center, a special checking code is used. To insure the accuracy of all calculations, two computers are used, to check every step in each calculation. The calculations are done by both computers, and then all figures and totals are compared to make sure they are accurate. Each computer can do the computation twice, to further reduce the possibility of error. There are also internal checking features in each computer.

HERE IS WHAT TH

REGULAR WAGERING PRINTOUT OF PAYOFF COMPUTATION

WN			WIN POOL COMPUTATION
SC		.00	LATE SCRATCHES
T		480,874.00	TOTAL WIN POOL
CM		73,481.10	COMMISSION
NP		416,392.90	NET POOL
PY		415,990.00	TOTAL PAYOFF ON WINNING TICKETS
BR		402.90	BREAKAGE
		.00	PROOF
PY	6—	8.50	(PAYOFF FOR WINNING HORSE
		21.25	FOR THE $2, $5, $10, $50 AND
		42.50	$100 WAGERS, INCLUDING
		212.50	COMBINATIONS)
		425.00	
			(IN THE EVENT OF A DEAD HEAT, THIS PRINTOUT IS REPEATED FOR THE SECOND HORSE INVOLVED.)
PL			PLACE POOL COMPUTATION
SC		.00	LATE SCRATCHES
T		397,565.00	TOTAL PLACE POOL
CM		59,634.75	COMMISSION
NP		337,930.25	NET POOL
PY		337,985.50	TOTAL PAYOFF ON PLACE TICKETS
BR	—	55.25	BREAKAGE—NOTE THE MINUS POOL
		.00	PROOF
PY	6—	4.40	AYOFF FOR WINNING HORSE
		11.00	UMBER 6 FOR THE $2. $5, $10,
		22.00	$50 AND $100 WAGERS,
		110.00	INCLUDING COMBINATIONS.)
		220.00	
PY	3—	3.80	(PAYOFF FOR PLACING HORSE
		9.50	NUMBER 3 FOR THE $2, $5, $10, $50 AND $100 WAGERS)
			(IN THE EVENT OF A DEAD HEAT, THIS PRINTOUT IS REPEATED FOR THE HORSES INVOLVED)

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THE SHOW POOL COMPUTATION PRINTOUT IS SIMILAR TO THE PLACE PRINTOUT EXCEPT THAT THREE HORSE PAYOFFS ARE SHOWN

C		4.00	COMBINATION PAYOFF COMPUTATION
PY	6—	12.90	PAYOFF FOR $4 COMB. ON WINNING HORSE
	3—	3.80	PAYOFF FOR $4 COMB. ON PLACE HORSE
C		6.00	
PY	6—	14.80	PAYOFF FOR $6 COMB. ON WINNING HORSE
	3—	8.20	PAYOFF FOR $6 COMB. ON PLACE HORSE
	5—	3.60	PAYOFF FOR $6 COMB. ON SHOW HORSE
C		10.00	
PY	6—	32.25	PAYOFF FOR $10 COMB. ON WINNING HORSE
	3—	9.50	PAYOFF FOR $10 COMB. ON PLACE HORSE

DAILY-DOUBLE PRINTOUT: PROBABLE PAYOFF FOR EACH SECOND RACE HORSE WITH WINNING HORSE IN THE FIRST RACE (AVAILABLE IMMEDIATELY AFTER THE FIRST RACE)

DD	6—		(DAILY-DOUBLE HORSE #6 HAS WON THE FIRST RACE)
	1—	45.20	PROBABLE PAYOFFS FOR HORSE #6 IN THE FIRST RACE WITH EACH OF THE HORSES IN THE SECOND RACE
	2—	57.90	
	3—	88.00	
	4—	23.10	
	5—	56.80	
	6—	123.30	
	7—	81.70	
	8—	55.00	

REGULAR WAGERING DENOMINATIONAL PRINTOUT OF THE PARI-MUTUEL TOTALS

WN		2.00
	1—	15,694.00
	2—	9,776.00
	3—	8,402.00
	4—	10,866.00
	5—	7,280.00
	6—	2,002.00
	7—	5,874.00
	8—	8,994.00
	9—	3,500.00
	10—	5,246.00
T		77,634.00
WN		5.00
	1—	3,455.00
	2—	10,670.00
	10—	9,895.00
T		58,240.00
WN		10.00
	1—	7,890.00
	2—	5,760.00
	10—	8,390.00
T		45,200.00
WN		50.00
	1—	4,050.00
	2—	7,000.00
	10—	3,650.00
T		33,250.00
WN		100.00
	1—	5,400.00
	2—	4,800.00
	10—	2,700.00
T		25,800.00

WN	1—	36,489.00
WN	2—	38,006.00
WN	10—	29,791.00
T		460,842.00

C		4.00
	1—	2,436.00
	2—	2,012.00
	10—	1,968.00
T		18,844.00
C		6.00
	1—	4,896.00
	2—	3,726.00
	10—	2,286.00
T		24,258.00
C		10.00
	1—	4,570.00
	2—	3,530.00
	10—	7,250.00
T		22,048.00

FOR PLACE, THE ABOVE IS REPEATED WITH "PL" INSTEAD OF "WN". FOR SHOW, THE ABOVE IS REPEATED WITH "SH" INSTEAD OF "WN". THE COLUMN ABOVE WHICH SHOW THE PRINTOUT TOTALS FOR COMBINATION WAGERING, FOLLOW THE SHOW PRINTOUT.

PRINTOUT WILL INCLUDE:

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· REGULAR WAGERING PRINTOUT OF NUMBER OF WAGERS ON EACH HORSE AT EACH WINDOW

WINDOW # / HORSE	1	2	3	4	5	6	7	8	9	10	TOTAL
001	246	175	242	163	284	272	169	172	161	191	2,075
.	.	.	.	.	.	.	.	.	.	.	
.	.	.	.	.	.	.	.	.	.	.	
135	379	48	326	176	135	221	26	216	117	211	1,855
136	127	271	19	200	305	96	101	161	171	121	1,572
.	.	.	.	.	.	.	.	.	.	.	
.	.	.	.	.	.	.	.	.	.	.	
350	167	215	115	45	54	169	141	372	300	212	1,790

· DAILY DOUBLE PRINTOUT OF NUMBER OF WAGERS ON EACH COMBINATION AT EACH WINDOW

WINDOW #	FIRST RACE HORSE	SECOND RACE HORSES 1	2	3	4	5	6	7	8	TOTALS
001	1	271	372	127	261	139	77	277	119	1,643
	2	165	172	271	265	391	222	111	121	1,718
	3	256	217	179	115	166	199	152	155	1,439
	.	.	.	.	.	.	.	.	.	.
	8	.	.	.	.	.	.	.	.	.
TOTALS		692	761	577	641	696	498	540	395	4,800
002	1	143	172	171	115	151	142	143	174	1,211
	2	165	177	172	151	232	214	391	372	1,874
	.	.	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	.	.	.
TOTALS		309	349	343	266	383	356	534	546	3,086
120	1	167	324	243	311	333	214	216	261	2,069
	.	.	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	.	.	.
	8	176	234	167	131	313	124	162	114	1,421
TOTALS		343	558	410	442	646	338	378	375	3,490
SUMMARY		1,344	1,668	1,330	1,349	1,725	1,192	1,452	1,316	11,376

DAILY-DOUBLE PARI-MUTUEL TOTALS PRINTOUT—FIRST RACE WINNER WITH $2 AND $10 WAGERS FOR SECOND RACE HORSES

DD		2.00	DAILY-DOUBLE $2 COMPUTATION
T		357,866.00	TOTAL DAILY-DOUBLE $2 WAGERS
WN	6—		HORSE #6 IS FIRST RACE WINNER
	1—	12,548.00	TOTAL $2 WAGERS ON SECOND RACE HORSE 1 WITH #6
	2—	14,944.00	TOTAL $2 WAGERS ON SECOND RACE HORSE 2 WITH #6
	3—	9,866.00	TOTAL $2 WAGERS ON SECOND RACE HORSE 3 WITH #6
	4—	11,832.00	TOTAL $2 WAGERS ON SECOND RACE HORSE 4 WITH #6
	5—	8,546.00	TOTAL $2 WAGERS ON SECOND RACE HORSE 5 WITH #6
	6—	17,256.00	TOTAL $2 WAGERS ON SECOND RACE HORSE 6 WITH #6
	7—	10,570.00	TOTAL $2 WAGERS ON SECOND RACE HORSE 7 WITH #6
	8—	6,582.00	TOTAL $2 WAGERS ON SECOND RACE HORSE 8 WITH #6
T		92,144.00	TOTAL $2 WAGERS ON ALL SECOND RACE HORSES AND #6
DD		10.00	DAILY-DOUBLE $10 COMPUTATION
T		369,400.00	TOTAL DAILY-DOUBLE $10 WAGERS
	1—	13,620.00	TOTAL $10 WAGERS ON SECOND RACE HORSE 1 WITH #6
	2—	9,220.00	TOTAL $10 WAGERS ON SECOND RACE HORSE 2 WITH #6
	3—	8,540.00	TOTAL $10 WAGERS ON SECOND RACE HORSE 3 WITH #6
	4—	15,240.00	TOTAL $10 WAGERS ON SECOND RACE HORSE 4 WITH #6
	5—	13,200.00	TOTAL $10 WAGERS ON SECOND RACE HORSE 5 WITH #6
	6—	10,870.00	TOTAL $10 WAGERS ON SECOND RACE HORSE 6 WITH #6
	7—	8,570.00	TOTAL $10 WAGERS ON SECOND RACE HORSE 7 WITH #6
	8—	9,560.00	TOTAL $10 WAGERS ON SECOND RACE HORSE 8 WITH #6
T		88,820.00	TOTAL $10 WAGERS ON ALL SECOND RACE HORSES AND #6
DD		727,266.00	TOTAL DAILY-DOUBLE POOL

· DAILY DOUBLE PAYOFF CALCULATION PRINTOUT

DD			DAILY DOUBLE COMPUTATION
SC		.00	CONSOLATION POOL
T		727,266.00	TOTAL DAILY DOUBLE POOL
CM		109,089.90	COMMISSION
NP		618,176.10	DAILY DOUBLE NET POOL
PY		617,586.40	TOTAL PAYOFF OF WINNING TICKETS
BR		589.70	BREAKAGE
		.00	PROOF
PY	6-5	2.00	
		56.80	PAYOFF FOR $2 TICKETS
PY	6-5	10.00	
		284.00	PAYOFF FOR $10 TICKETS

For immediate use as well as for permanent records, the All-Electronic Totalizator provides the means whereby all transactions are recorded on paper, by means of a high-speed printer, which functions at a rate of 900 lines per minute. This is called the "printout". These records include the number of transactions for each horse at each ticket issuing machine (or window). For regular wagering, the printout of the number of regular wagers made on each horse, at each window, is done at the rate of 15 windows per second. For daily-double wagering, the rate of 0.6 seconds per window for an 8-horse field, one second for a 15-horse field.

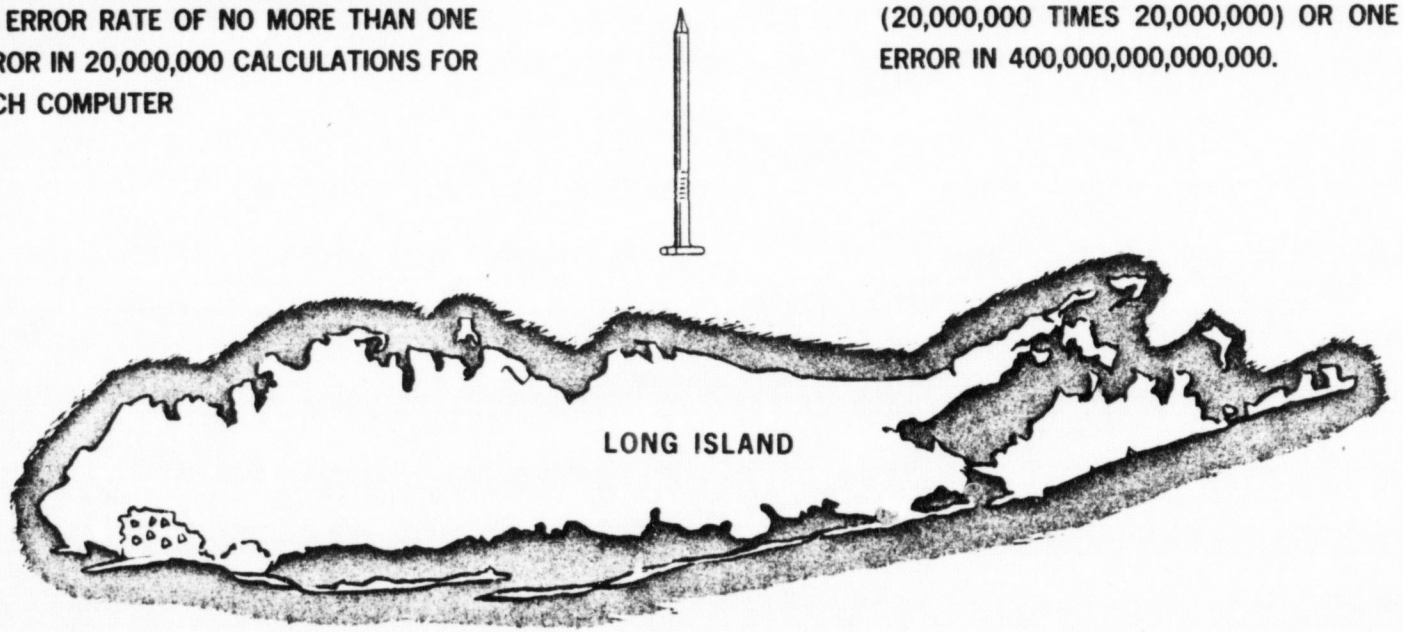
For a track with less than 400 active windows, the total printout is completed for regular wagers in less than 40 seconds after wagering has ended and windows closed. The equipment also is capable of providing similar printout of the number of wagers placed at each daily-double window. For regular wagers, the printout will accommodate a total of fifteen 3-digit transaction amounts for each window. This allows up to 999 wagers to be made on each horse at each window, with means to prevent the seller from recording a 1,000th wager on a given horse. The daily double printout will accommodate sixty-four 3-digit printouts for each window, to allow for an 8-horse daily-double operation, or 225 for a 15-horse operation.

The chart at the left illustrates what the printout will include. Complete payoff calculations will be printed out, regardless of the number of dead heats in any position or the number of horses in the field.

WE ESTIMATE LESS THAN 1 ERROR IN 400,000,000,000,000 CALCULATIONS (400 TRILLION)

OUR EXPERIENCE WITH SOLID-STATE DIGITAL ELECTRONIC EQUIPMENT INDICATES AN ERROR RATE OF NO MORE THAN ONE ERROR IN 20,000,000 CALCULATIONS FOR EACH COMPUTER

SINCE TWO COMPUTERS ARE USED, THE ERROR RATE IS THE PRODUCT OF BOTH (20,000,000 TIMES 20,000,000) OR ONE ERROR IN 400,000,000,000,000.



The experience we have had with solid-state digita electronic equipment indicates that we can expec no more than one error in 20,000,000 calculation for each computer. Since two computers are the error rate is the product of both. 20,000,00 multiplied by 20,000,000 results in an estimat of less than one error in 400,000,000,000,00 (400 trillion) calculations. To illustrate these figure graphically, take an area like Long Island, whic consists of approximately 1,500 square miles. one nail were sticking up somewhere in this 1,50 square mile area, and a car were to be driven ove every inch of the entire area, the possibility o getting that nail into one of the tires — is a remote as getting one error with the All-Electroni Totalizator.

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This, then, is the All-Electronic Totalizator. It offers far more advantages than any other equipment in use today . . . too many to enumerate in this brochure. The system can be modified to include fields of up to 30 horses. It can include such features as Quiniella, Quiniella Exacta, and Tiercé wagering. Advance wagering can be included. The design of the system is so flexible in capacity, that the same basic system can be efficiently and economically expanded to include more ticket issuing machines and more display boards. In other words, the system can be adapted to meet **your** particular requirements.

The All-Electronic Totalizator, marketed by Westbury Electronic Corp., was created by the Digitronics Corporation, an organization which has established an enviable reputation in the electronics field, particularly with regard to solid-state (all-transistorized) data processing equipment.

The first commercial installation of a solid-state converter (for conversion between magnetic tape and paper tape) was made by Digitronics for the largest stock brokerage firm in the country — Merrill Lynch, Pierce, Fenner & Smith. Digitronics converters have been created for other world-renowned organizations, including Aluminum Co. of America, Bache & Co., Canadian Pacific Railway Co., Tokyo Electric Power Co., Radio Corporation of America, Spiegels, the U. S. Strategic Air Command and others.

Digitronics also created the Dial-o-verter System, for the high-speed transmission of data, over regular telephone lines, to and from any number of widely scattered points. Dial-o-verter Systems are functioning throughout the country for Lever Brothers, Kellogg's, Mohasco Industries, Canadian Pacific Railway Co., the Applied Physics Laboratory of Johns Hopkins University, the U. S. Veterans Administration, the Social Security Administration, and many others.

Now Digitronics has created the world's first All-Electronic Totalizator. A prototype has been produced, successfully demonstrated, and the first complete system is in production. For further information about the All-Electronic Totalizator, address communications to:

WESTBURY ELECTRONIC CORP.
c/o ROOSEVELT RACEWAY
Westbury, Long Island, N. Y. • Phone: PI 6-6000

WESTBURY ELECTRONIC CORP.

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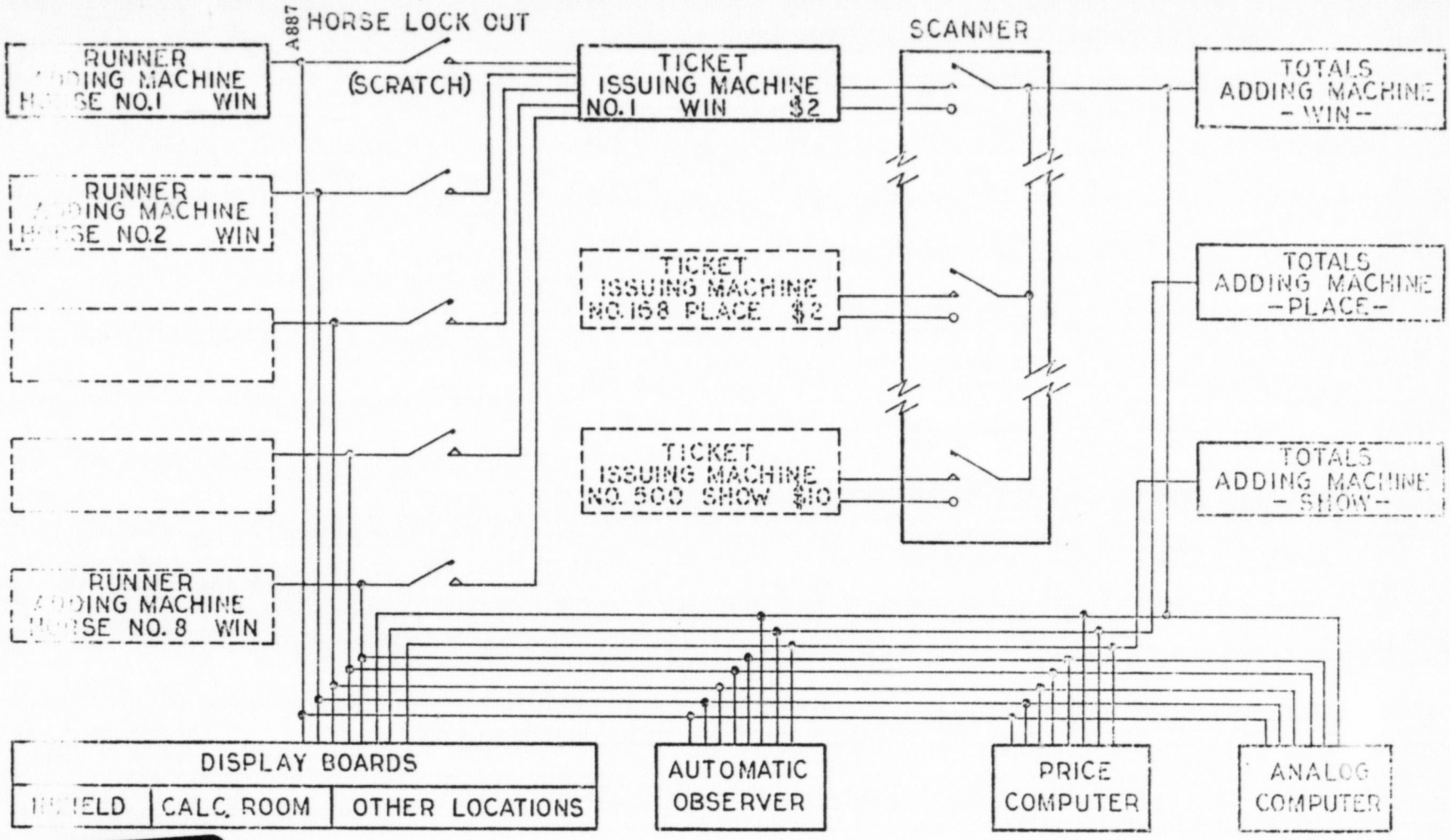

DEFENDANT'S EXHIBIT X
NO. 62C1119

AQUEDUCT TOTALIZATOR SYSTEM 1960-1961

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DEFENDANT'S EXHIBIT
AP EV
NO 670-1119

AGREEMENT

AGREEMENT entered into this 31st day of January, 1961, between DIGITRONICS CORPORATION, a ~~New York~~ Delaware corporation, having its principal place of business at Albertson Avenue, Albertson, Long Island, New York (hereinafter called "Digitronics"), and WESTBURY ELECTRONIC CORP., a New York corporation, having its principal place of business at 1539 Franklin Avenue, Mineola, Long Island, New York (hereinafter called "Westbury"):

WITNESSETH:

WHEREAS, Digitronics is engaged in the design, manufacture, distribution and maintenance of a variety of electronic systems and devices:

and

WHEREAS, Westbury wishes to purchase from Digitronics a prototype of an electronic totalizator (hereinafter called the "Prototype") and to purchase from Digitronics a full scale electronic totalizator (hereinafter called the "First Totalizator") and Digitronics is willing to design, manufacture and sell to Westbury such Prototype and such First Totalizator, all upon the terms and conditions set forth herein: and

WHEREAS, Digitronics has agreed to endeavor to develop an electronic totalizator system that will service the pari-mutuel system at Roosevelt Raceway, Long Island, New York, ~~and at Yonkers Raceway, Yonkers, New York~~, with at least comparable accuracy and superior speeds as is accomplished by the present totalizator system at said Raceways: and

WHEREAS, Westbury wishes to acquire from Digitronics certain distribution rights, as herein set forth, for additional electronic totalizators to be manufactured by Digitronics (hereinafter called "Additional Totalizator" or "Additional Totalizators" according to context): and

WHEREAS, Digitronics is willing to grant such distribution rights upon the terms and conditions set forth herein:

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NOW, THEREFORE, in consideration of the premises and the mutual covenants herein contained, the parties hereto agree as follows:

1. For all purposes of this agreement the following terms shall have the meanings set forth below, unless otherwise specifically provided:

(a) The term "Labor" shall mean the time of officers and employees of Digitronics employed in the design, manufacture, testing and installation of each electronic totalizator system to be sold pursuant to the terms of this agreement, and shall not include overhead expenses.

(b) The term "Special Materials" shall mean components or equipment purchased by Digitronics from others for incorporation into or use with each system to be sold pursuant to the terms of this agreement, but not requiring processing on the part of Digitronics.

(c) The term "Materials" shall mean materials, components or equipment (other than Special Materials) incorporated into or used with each system to be sold pursuant to the terms of this agreement.

(d) The term "Production Costs" shall mean (i) the cost of all Special Materials, (ii) 1.1 times the cost of all Materials, (iii) 2.95 times the cost of all Labor, including Labor expended in the installation and integration of Special Materials and Materials in the System, and (iv) all interest charges and other expenses incurred by Digitronics in obtaining funds to finance the costs described in this subparagraph (d); provided, however that such interest charges and other expenses shall not exceed 6% of items (i), (ii) and (iii) of this subparagraph (d).

(e) The term "Required Approvals" shall mean the approvals of all commissions, agenci organizations or other bodies, governmental or otherwise, the approvals of which are require before the First Totalizator or any Additional Totalizator may be operated in New York State

(f) The term "Acceptance Test" shall mean the test of the Prototype or of the First Totalizator prescribed by the specifications set forth in Exhibit "A" and Exhibit "B" hereto, respectively, (with such modifications of Exhibit "B" as may be necessary by reason of the terms and conditions of the "Required Approvals"), which Exhibits shall be considered part and parcel of this agreement.

2. Digitronics agrees to design, manufacture, sell and deliver to Westbury, and Westbury agrees to purchase from Digitronics, a Prototype, meeting the specifications set forth in Exhibit "A" hereto, and the First Totalizator meeting the specifications set forth in Exhibit "B" hereto (as so modified), all in accordance with the terms of this agreement.

3. Westbury agrees that, upon the delivery of such Prototype and the satisfactory completion of the Acceptance Test set forth in Exhibit "A", it will reimburse Digitronics for its Production Costs in connection with the design, manufacture and testing of such Prototype; provided, however, that the sum payable by Westbury as aforesaid shall in no case exceed $150,000.

4. Digitronics agrees to use its best efforts to make delivery of the Prototype, at the earliest practicable date but not later than March 31, 1961, at its plant in Albertson, Long Island, New York.

5. Westbury agrees to use its best efforts to obtain the Required Approvals of the Prototype and the First Totalizator at the earliest practicable date.

6. The parties agree, subject to the terms and conditions of this agreement, that when and in the event that all Required Approvals have been obtained, Digitronics shall complete the design and commence the manufacture of the First Totalizator, in accordance with the specifications set forth in Exhibit "B" hereto (with such modifications as may be necessary by reason of the terms and conditions of the Required Approvals). Notwithstanding that all Required Approvals may not have been obtained, Westbury shall have the election to give Digitronics a written order to complete the design and manufacture the First Totalizator as aforesaid. Upon receipt of such

order Digitronics will comply therewith and said First Totalizator shall be delivered and paid for in accordance with the terms of this agreement.

Digitronics agrees to use its best efforts to deliver said First Totalizator by June 30, 1962, p that the Required Approvals shall have been given or Digitronics shall have received from Westbury the order above referred to not later than June 30, 1961.

Westbury may elect to cancel its purchase of the First Totalizator within four months after the Required Approvals have been obtained or the order is placed by Westbury, whichever is the sooner, by paying Digitronics the sum of $150,000 as liquidated damages, sent by registered mail to the address set forth above. Westbury may also elect to cancel its purchase of the First Totalizator after said four months have elapsed, by paying Digitronics the sum of $250,000 as liquidated damages, sent by registered mail to the address set forth above. In the event of such cancellation, Westbury shall also pay to Digitronics, in addition to said liquidated damages, a sum sufficient to reimburse Digitronics for actual production costs, including material, labor and overhead costs, as certified to by Messrs. Lybrand, Ross Bros. & Montgomery (but not to exceed Production Costs as defined in paragraph 1 (d) above) as having been incurred by Digitronics in connection with the First Totalizator to the date on which such liquidated damage payment shall have been received. Digitronics agrees to accept said sum in full and complete satisfaction of all damages and claims hereunder.

7. Westbury agrees to pay Digitronics for the design, manufacture and testing of the First Totalizator the following sums:

(a) Upon completion of the logical design and the approval thereof by Westbury's technicians, the sumof $50,000.

(b) Three months thereafter the sum of $100,000.

(c) Six months thereafter the sum of $100,000.

(d) Upon the satisfactory completion of the Acceptance Test set forth in Exhibit "B" at the plant of Digitronics at Albertson, Long Island, New York, utilizing 16 ticket dispense covering all pools and daily doubles, the sum of $50,000.

(e) Following the delivery and installation of the First Totalizator at Roosevelt Raceway, with all ticket dispensers called for by Exhibit "B", Westbury will pay the balance of the purchase price. The purchase price shall be 130% of Production Costs as defined in paragraph 1 (d), but not more than $1,500,000 (plus or minus a reasonable amount to reflect any modifications of Exhibit "B" that may be necessary by reason of the terms and conditions of the "Required Approvals" and plus any costs of the Prototype in excess of $150,000). Such final payment shall be made within thirty days after the satisfactory completion of the final Acceptance Test set forth in Exhibit "B".

Roosevelt Raceway ~~or at Yonkers Raceway~~ with accuracy and speeds at least comparable to the present totalizator system of said Raceway, then Westbury may accept the First Totalizator, but the balance of the purchase price referred to above shall be reduced by $65,000. In case the First Totalizator shall not service the pari-mutuel system at Roosevelt Raceway ~~or Yonkers Raceway~~ with accuracy and speeds at least comparable to those of the present totalizator system at said Raceways, and Westbury does not accept said Totalizator as provided in this paragraph, then Digitronics shall repay the amount of the foregoing progress payments to Westbury in three equal annual installments beginning twelve months after said date, and neither party hereto shall be under any obligation to the other hereunder, for damages or otherwise, except that the First Totalizator shall be returned to Digitronics.

8. Digitronics and Westbury agree to enter into a Service Agreement relating to the First Totalizator, under which Digitronics will agree to provide such Materials and to train such personnel as may be required to operate and service adequately the First Totalizator and under which Westbury will agree to pay Digitronics $700.00 per week for each skilled electronic technician required to service and operate adequately the First Totalizator, together with charges for less skilled service personnel and Materials and Special Materials required in connection with the operation and servicing of said system, priced in accordance with Paragraph 1 (d) hereof. It is intended that Digitronics realize a reasonable profit from such service contract. If after two years of such service, it is apparent that the charges for services do not return such reasonable

profit or do return an excessive profit, the parties shall review such charges and adjust same to reflect a reasonable profit. If any of the equipment delivered under any provision of this agreement is to be operated outside the State of New York, Digitronics shall have the election to service the same through its own employees or to arrange for comparable servicing by others.

9. If the purchase of the First Totalizator shall have been consummated in accordance with the terms of this agreement, Digitronics hereby grants to Westbury exclusive world-wide distribution rights (except as stated below) for Additional Totalizators to be manufactured and serviced by Digitronics. Digitronics agrees to service such Additional Totalizators in accordance with the requirements demanded by the Additional Totalizators delivered. Such exclusive distribution and service rights shall be for a period of ten years after the date of delivery of the First Totalizator to Westbury. If during said period Westbury shall have placed orders with Digitronics for at least Five (5) Additional Totalizators, then Westbury shall have the option to have said distribution rights continued for an additional period of ten years. Westbury shall also have the option to have said distribution rights continued for two further additional periods of ten years each if, during each previous ten-year period, Westbury shall have placed orders with Digitronics for at least five Additional Totalizators.

In the event that no purchase order for an Additional Totalizator is received by Digitronics from Westbury within six years after the date of the delivery of the First Totalizator to Westbury, then all distribution rights granted by Digitronics to Westbury shall, at the election of Digitronics revert immediately to it.

Digitronics reserves the entire rights to sell any and all types of electronic totalizator equipment for the racing requirements in the presently existing thoroughbred tracks in the State of New York; provided, however, that if no sale of such equipment shall have been made within twenty-four months from the date of this agreement, then this exception to the distribution rights of Westbury shall terminate.

It is agreed that the discontinuance of Westbury's distribution rights under any of the provisions of this agreement shall not affect the right of Westbury to use, lease or sell any systems delivered hereunder prior to such discontinuance, nor affect the right or obligation of Westbury to have Digitronics service any systems previously delivered hereunder.

10. Westbury agrees that, for the duration of said distribution rights, it will use its best efforts to promote the use throughout the world, either by sale or rental, of as many Additional Totalizators as possible, to be manufactured and serviced by Digitronics, and Westbury agrees, during said period, that it will not promote any other totalizator system. The purchase price for such additional Totalizators ordered by Westbury shall be 130% of Production Costs, and the fees to be charged by Digitronics for operating and servicing such Additional Totalizators shall provide Digitronics with a reasonable profit after all costs. The purchase price and the service fees are to be paid by Westbury to Digitronics whether Westbury leases or sells such Additional Totalizators.

Each order for an Additional Totalizator shall be accompanied by a down payment of $50,000, and progress payments of $100,000 each shall be payable three months and six months after work has commenced on that order. Upon the satisfactory completion of the first Acceptance Test specified in each order, (to be held at the plant of Digitronics at Albertson, Long Island, N.Y.), a sum of $50,000 shall be paid to Digitronics; and upon the delivery and installation of the completed totalizator at the track at which it will be used with all ticket dispensers called for by the specifications for each order, Westbury will pay the balance of the purchase price within thirty days after the satisfactory completion of the final Acceptance Test specified for each additional order.

11. No part of the distribution rights of Westbury may be assigned without the written consent of Digitronics except to companies controlled by Westbury.

In the event that Roosevelt Raceways, Inc. ~~and Yonkers Raceways, Inc. do not collective~~ does not ~~or individually~~ own at least 51% of the outstanding stock of Westbury having general voting powers, it is agreed that all rights granted to Westbury hereunder shall, at the election of Digitronics, revert immediately to Digitronics, unless (a) Digitronics shall receive at least one purchase order for an Additional Totalizator within two years after such event (whether or not other orders had been placed prior to such event) and (b) commencing with the third year after such event, Digitronics shall receive at least one purchase order for an Additional Totalizator during each twelve-months' period.

12. It is understood and agreed that all rights to manufacture the First Totalizator or any Additional Totalizators and all patent rights of Digitronics shall remain in Digitronics and that all information and documents containing information with respect to the design, logic, organization, construction or operation of the Prototype, the First Totalizator and any Additional Totalizators, including the copies of Exhibits "A" and "B" to the various count parts of this agreement shall be the sole property of Digitronics. Digitronics, during the life of this agreement, and Westbury both during and after the life of this agreement, shall refrain from disclosing any of such information to others, except insofar as disclosure is necessary in order to obtain the Required Approvals hereunder, or to obtain sales or rentals of Additional Totalizators. Westbury agrees to maintain all copies of Exhibits "A" and "B" here in the custody of responsible officers of such corporation and not to make any other copies of such exhibits. Westbury further agrees to return to Digitronics promptly upon request, all suc copies and specifications (whether or not attached to counterparts hereof) if the First Totalizator shall not have been purchased in accordance with the terms of this agreement, or if this agreement shall be terminated by consent of the parties hereto or otherwise. The provisions of this paragraph 12 shall survive any termination of this agreement.

13. Digitronics shall indemnify and save harmless Westbury from any claims or judgments against Digitronics or Westbury based upon any claimed infringements of any patent issued prior to the date of delivery of the equipment covered by this agreement. If any action is brought against Westbury based upon any such claimed infringement, Westbury shall promptly give written notice thereof to Digitronics and Digitronics thereupon shall defend said action on behalf of Westbury without cost to Westbury. However, Digitronics shall not be liable if any patent under which it is licensed is held to be invalid in any material respect after the date of delivery of equipment under this agreement, but Westbury shall be subrogated to the rights of Digitronics under any such license.

14. Digitronics shall not be liable for loss, damage, detention or delay resulting from or caused by acts of God, force majeure, epidemic, fire, explosion, flood, act of public enemy, riots, strikes, lockouts, labor disputes, restrictions of the United States Government or any department, branch or representative thereof, orders or acts of civil or military authority, inability to obtain necessary materials, parts or components, damage to plants, equipment or facilities, embargoes, car shortages, wrecks or delays in transportation, or other causes.

15. (a) This agreement may not be modified or amended except by an instrument in writing duly executed by the parties hereto. No waiver of compliance with any provision or condition hereof shall be effective unless evidenced by an instrument in writing duly executed by the party hereto sought to be charged with such waiver.

(b) This agreement contains the entire agreement between the parties hereto and supercedes all prior agreements, understandings and discussions between the parties hereto with respect to the subject matter hereof.

16. Any notice or other communication required or permitted to be given hereunder may be sent by regular mail, except as otherwise specifically provided herein, to the addresses stated above or to such other addresses as may hereafter be designated by any party in writing.

17. This agreement shall be deemed to have been made under the laws of the State of New York and shall be read, construed and given effect in accordance therewith.

18. Any controversy or claim arising out of, or relating to, this agreement or the breach thereof, shall be settled by arbitration, in the City of New York in accordance with the rules of the American Arbitration Association by an arbitrator to be chosen by the then President of the Institute of Radio Engineers and judgment upon the award rendered may be entered in the Supreme Court of the State of New York or in any other court having jurisdiction thereof.

19. Westbury agrees to pay and indemnify Digitronics against such taxes, if any, as shall be payable by reason of the purchase by it of the Prototype, the First Totalizator and any Additional Totalizators.

20. This agreement may be executed in one or more counterparts, and all such counterparts shall constitute one and the same instrument.

IN WITNESS WHEREOF, the parties hereto have caused this agreement to be duly executed as of the day and year first above written.

DIGITRONICS CORPORATION

ATTEST: Eugene Leonard
Chairman of the Board
Vice President

By Eric H. Hewlett
President
Chairman

WESTBURY ELECTRONIC CORPORATION

ATTEST:
W. A. Young

By Allen Lilley

A899

ROOSEVELT RACEWAY

SIMULATOR

9175 PR

EXHIBIT A

DIGITRONICS CORPORATION
Albertson Avenue
Albertson, L.I., N.Y.
November 1959

TABLE OF ILLUSTRATIONS

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1	CENTRAL CONTROL UNIT AND DISPLAY PANEL
2	DISPLAY OF DAILY DOUBLE POOL
3	DOLLARS BET ON COMBINATION OF 1ST RACE WINNER AND EACH HORSE IN 2ND RACE
4	TOTAL TRANSACTIONS FOR COMBINATION OF 1ST RACE WINNER + EACH HORSE IN SECOND RACE,
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6	PROBABLE ODDS AND TOTALS BET ON EACH HORSE DURING REGULAR BETTING
7	WIN, PLACE AND SHOW POOLS
8	TOTAL WIN, PLACE, SHOW POOLS AND INDIVIDUAL HORSE DATA AFTER THE END OF BETTING
9	COMPLETE CONTROL PANEL

ROOSEVELT RACEWAY SIMULATOR

SECTION 1 GENERAL DESCRIPTION

The purpose of the Simulator is to demonstrate, on a smaller scale, how the actual system of ticket dispensing, computation and display will function for both the Daily Double and regular betting operations. The basic differences between the Simulator and the ultimate and complete system are:

1.1 Less betting units are used:

The Daily Double operation uses 8 machines for recording. Sixteen sources of betting information are provided for regular betting.

1.2 Indicators display data in timed sequences:

a) Instead of displaying information internally for use of computation personnel and externally for the betting public, the Simulator demonstration provides information for internal use. Any information so displayed could be made available to show on all public display panels.

b) Instead of displaying information simultaneously and necessitating the use of many display panels, the Simulator system displays information sequentially and identifies the data shown. For example in the Daily Double the gross dollar total bet for each horse in the second race, in combination with the winning horse, is shown sequentially. The same procedure is used to display the probable win odds for each horse in the regular betting operation.

c) The capability of manual control of display of information can be readily demonstrated by the Simulator. By pressing the "One Step" button in the display section of the Control Panel (Figure 3) the information being displayed at the time remains fixed. The next information is not displayed until the "Step" button is pressed. Thus in the "One Step" mode the display of odds for each horse is under complete control of the "step" button.

1.3 Daily Double and regular betting operation are not simultaneous:

The Simulator operates either for the Daily Double or the regular betting operation as determined by the setting of the operation selector button on the Control Panel.

1.4 Limited betting denominations:

To conserve equipment only $2 and $10 bet denominations are handled.

SECTION 2 DAILY DOUBLE OPERATION

2.1 During the betting period:

Bets on two 8-horse races are recorded by eight dual keyboard simulated (non-ticket dispensing) machines. The value of the transaction for each machine is either $2.00 or $10.00 as determined by the setting of the plugboard in the Central Control Unit (see Figure 1).

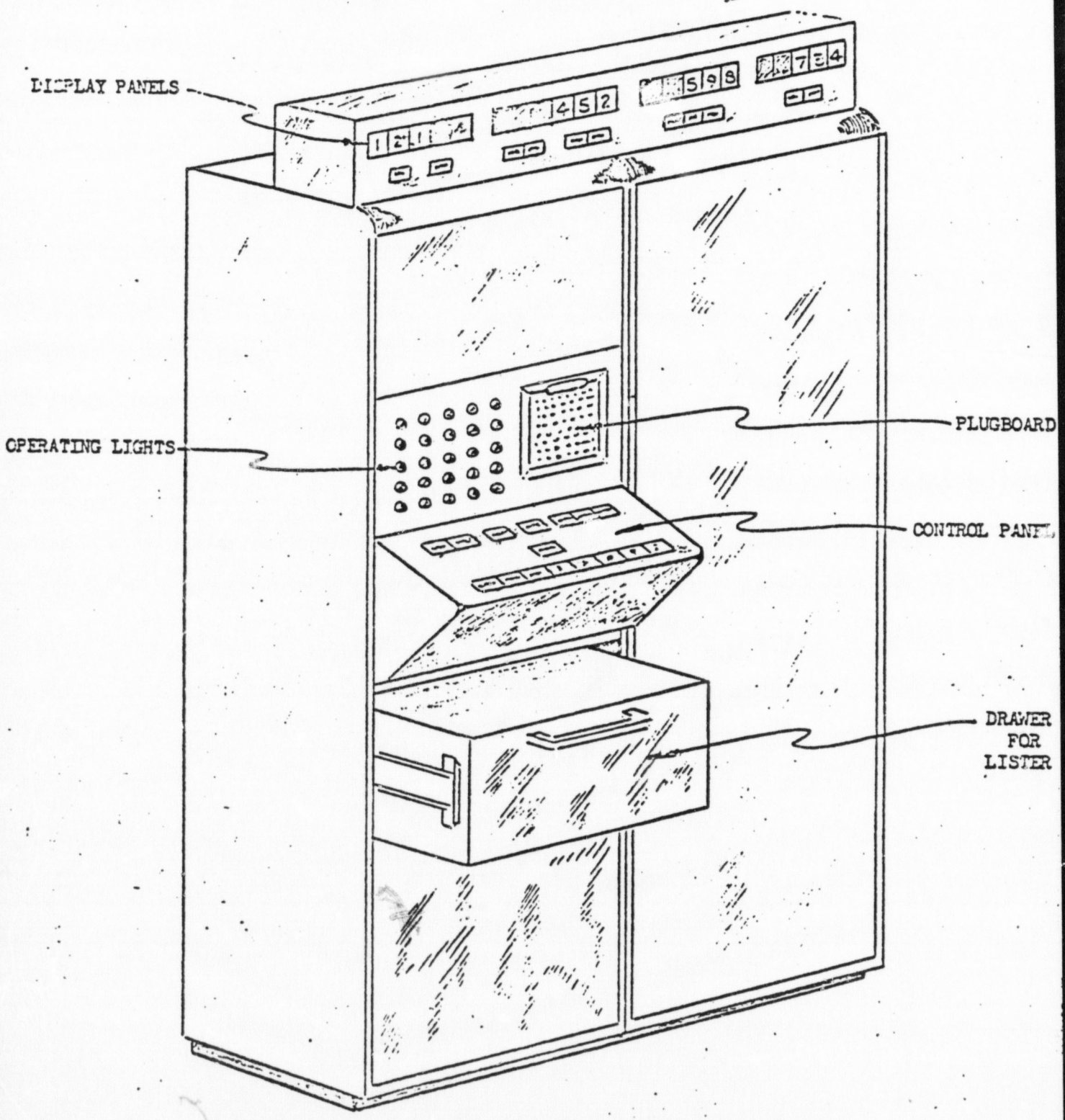


FIGURE 1 CENTRAL CONTROL UNIT AND DISPLAY PANELS

2.2 At the end of the betting period:

On receipt of an "End Betting" signal from the Central Control Unit all simulated machines become inoperative. The Daily Double total pool is displayed (Figure 2).

2.3 At the end of the first race:

The "Dollar Total" and the "First Race" buttons are pressed. Then one of eight buttons corresponding to the winning horse is pressed. This results in a display and print-out of the dollars bet for each horse in the second race in combination with the first race winner in the following manner (also see Figure 3).

2.3.1 The display for each horse in the second race in combination with the first race winner appears in sequence. As the number indicating the horse in the second race lights in the "Horse No." panel, the dollars bet on the combination appear on the appropriate panel, and the term "Daily Double" and "$ Bet" is illuminated (Figure 3).

2.3.2 While the information is displayed the same data is printed on the lister using a line per horse combination. The display for each horse lasts for three seconds.

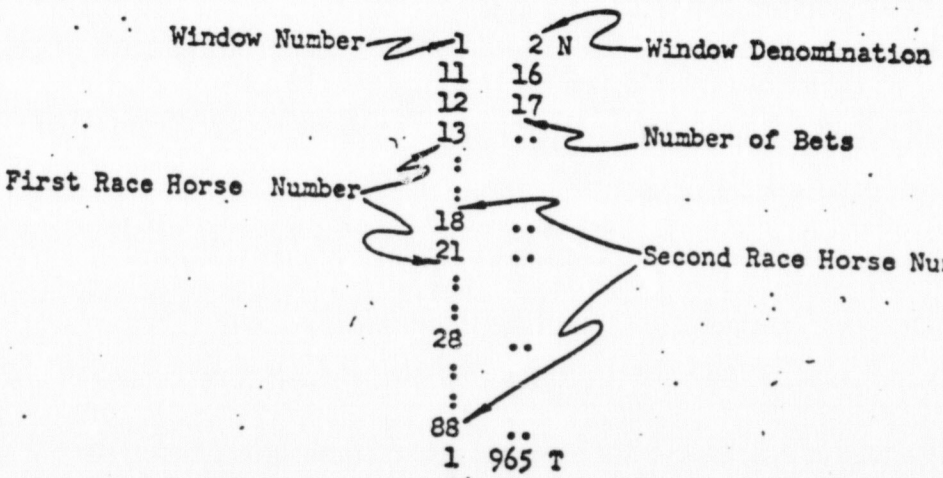
2.4 On demand any of the following data is available by selection:

2.4.1 Total $2 or $10 transactions for each horse in the second race in combination with the first race winner (Figure 4).

2.4.2 Total $2 or $10 transactions of any horse in the first race in combination with each horse in the second race (Figure 4).

2.4.3 Total $2 or $10 transactions of any horse in the second race in combination with each horse in the first race (Figure 5)

2.5 By pressing the "Window Print-Out" button (Figure 9) a print-out occurs on the lister of the total transactions for that window in the following format:



```
2    2 N
11  36
 :
 :
18  75
 :
 :
88  56
 3 524 T
```

The entire print-out takes approximately 3 minutes.

SECTION 3 REGULAR BETTING OPERATION

3.1 During the betting period:

3.1.1 Bets are recorded on fourteen simulated and two actual ticket dispensing machines. Each machine has ten keys to provide for a 10-horse race. The plugboard of the Central Control Unit (Figure 1) can be arranged to assign any of the following values to each of the 16 machines:

$ 2.00 W or P or S
$10.00 W or P or S
$ 6.00 ($2 WPS)
$10.00 ($5 WP)

3.1.2 Two sets of figures are displayed automatically during this period. First, and in sequence for each horse, the following is displayed (also see Figure 6):

Horse No.	Probable Odds	Total Win Bet	Total Place Bet	Total Show Bet

(for the horse indicated)

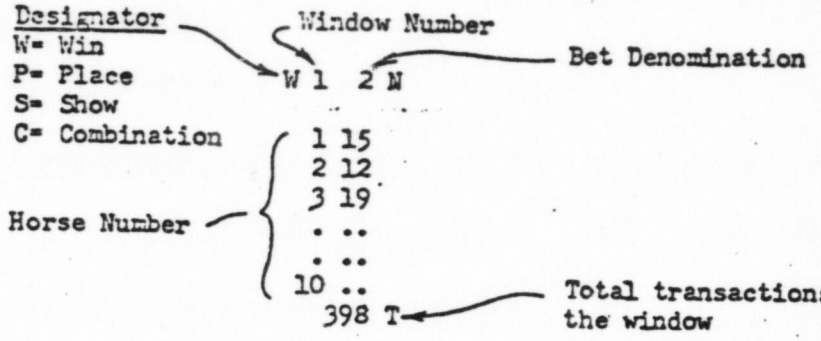
The term "Win", "Place", and "Show" light up beneath each panel. The information for each horse appears for three seconds.

3.1.3 Following the display for each horse a total pool display occurs. The "Odds" and "Horse No." panels are dark and the gross total Win, Place and Show Pools are displayed. Beneath each panel the designation "Win", "Place", "Show" and "Pool" light up. This display appears for 10 to 30 seconds, depending on the desired overall cycle time (see Figure 7).

3.2 At the end of the regular betting period, determined by pressing the "End Bet" button on the Central Control Unit the following occurs:

3.2.1 The display cycles are discontinued except as called for by the special controls (see Section 4). The Win, Place and Show Pools and the totals bet on each horse for Win, Place and Show as of the end of betting are obtained as shown in Figure 8.

3.2.2 Pressing the "Window Print-Out" button (Figure 9) results in a print-out in the following format:



The sequence of the print-out is:

all $ 2.00 win windows
all $10.00 " "
all $ 2.00 place windows
all $10.00 " "
all $ 2.00 show windows
all $10.00 " "
all $ 6.00 combination windows
all $10.00 " "

Following the print-out of the information for the $10.00 combination window, the total dollar win, place and show pools are printed thus:

$ 19645 T
$ 29768 T
$ 35792 T

SECTION 4 SPECIAL CONTROLS (Figure 9)

4.1 There are a wide variety of unusual circumstances which may arise for the operation of the parimutuel system during a race. These include dead heats, scratches, consolation pools, etc. In the Simulator no attempt is made to handle these situations automatically. Instead, the operator is given controls which allow him to print-out and display the necessary data for handling such situations. During the betting periods, either regular or Daily Double, these special controls will be disabled in the Simulator. In the final machine this restriction will be modified.

4.2 During the regular betting operation the controls will operate as shown below. It should be noted that, because the special controls are inoperative during the actual betting period, it will be impossible to correct the probable odds display in the event of a late scratch. This will not be the case in the final machine.

4.2.1 Three pushbuttons in the category "Pool Select" marked "Win", "Place" and "Show" are used to select the pool from which print-out and display are to be derived.

4.2.2 A group of four switches are provided for the "Display Mode" function.

4.2.2.1 When the "Dollar Total" pushbutton is set, the ensuing print-out and display will represent the total amount of money bet, in the pool selected in 4.2.1 above, on the horse selected in 4.2.3 below.

4.2.2.2 When the "Transaction Total" button is set, the ensuing print-out and display will represent the total number of transactions in the pool selected above and on the horse selected in section 4.2.3 below. (Each $2 bet represents one transaction and each $10 bet represents five transactions.)

4.2.2.3 When the "$2 Transaction" button is set, the ensuing print-out and display will represent the total number of $2 bets in the pool selected above and on the horse selected in section 4.2.3 below. (Each bet counting as one transaction.)

4.2.2.4 When the "$10 Transaction" button is set the ensuing print-out and display will represent the total number of $10 bets in the pool selected above and on the horse selected in section 4.2.3 below. (Each bet counting as five transactions.)

4.2.3 Ten pushbuttons are provided to enable the particular horse for which data is desired, to be selected. After the selections made in the previous section, immediately above, have been made, operation of the "Horse Number" pushbutton initiates the print-out and display.

4.2.4 As an example, let it be assumed that a horse has been scratched during the betting and it is necessary to correct the pools. After the end of betting, the "Win" button is selected, the "Dollar Total" pushbutton is pressed and the "Horse Number" button is pressed. The printer and display unit will show the amount of money bet on that horse to win. The "$2 Transaction" button is then pressed and the "Horse Number" is pressed. The printer and display unit will show the number of $2 win bets on the horse. (Each bet counting as five transactions.) Similarly the $10 bets and the corresponding Win, Place and Show data can be displayed.

4.3 <u>During the Daily Double operation</u>.

The operation of the special controls are exactly analagous to the operations described under section 4.2 above. The only exception is that the "Pool Select" controls are disabled and the "1st Race" and "2nd Race" pushbuttons become operative. These latter buttons define the race to which the "Horse Number" buttons apply. Thus, to obtain the data from which the Daily Double payoff computation is to be manually made, the operator sets the "1st Race" pushbutton, the "Dollar Total" pushbutton, and the appropriate "Horse Number" pushbutton. The resulting print-out and display will show the amount of money bet on the selected horse in the first race with each of the horses in the second race and followed by the total as shown below:

$ 1028 (combination of selected horse in first race with horse 1 in second)
$ 924 (" " " " " " " " " 2 " ")
$ 1160 (" " " " " " " " " 3 " ")
$ 204 (" " " " " " " " " 4 " ")
$ 128 (" " " " " " " " " 5 " ")
$ 1006 (" " " " " " " " " 6 " ")
$ 644 (" " " " " " " " " 7 " ")
$ 758 (" " " " " " " " " 8 " ")

$ 5842 (the total amount of money bet on the selected horse in the 1st race)

4.4 In the event a horse is scratched a wire will be plugged into the plugboard on the Central Control Unit so that no further betting can occur on that horse on any betting machine. If a Seller attempts to issue a ticket for that horse, the ticket issuing machine will not emit the ticket. The key of the issuing machine will remain locked in the "down" position and the transaction will not be recorded. The Seller will be able to release the locked key by operating a special release button. However, even when the key is released the ticket will not issue and the bet will not record at the Central Unit.

SECTION 5 EQUIPMENT

The Simulator will consist of the following equipment (see figures):

2 Ticket dispensing machines. Each machine will have ten keys for issuing tickets for ten horses, plus a key to allow the issuing of a test ticket, plus a release key. The latter is used to release the machine if a disallowed horse number key is used. If such a key is used no ticket issues and no transaction is recorded centrally. The machine includes a mechanical counter which records the total number of tickets issued.

The printed ticket will be similar in format and paper to the tickets presently dispensed at the track.

16 Simulated (non-ticket dispensing) machines. Each machine has ten keys capable of recording betting information for ten horses. During the Daily Double operation the 16 machines are paired to provide 8 dual keyboard machines.

1 Printer (adding-machine type)

4 Five-digit in-line displays which show illuminated numerals.

3 Racks of electronic accumulator, computation, checking and control equipment capable of accumulating up to 99 transactions for each horse for each window; computing the information described in the proposal and controlling the print or display of all information required. A plugboard is provided which can be arranged to determine the value and nature of the transaction for each machine.

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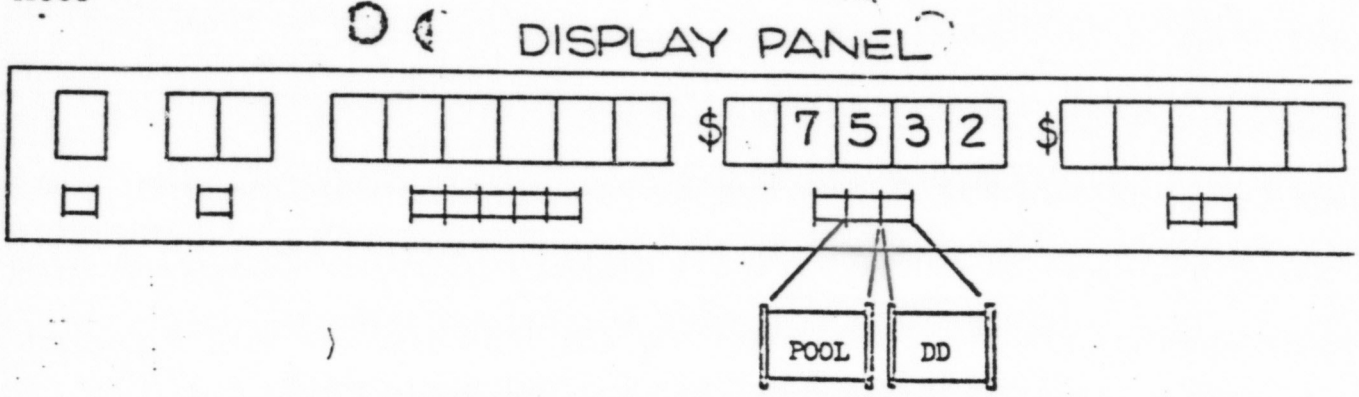
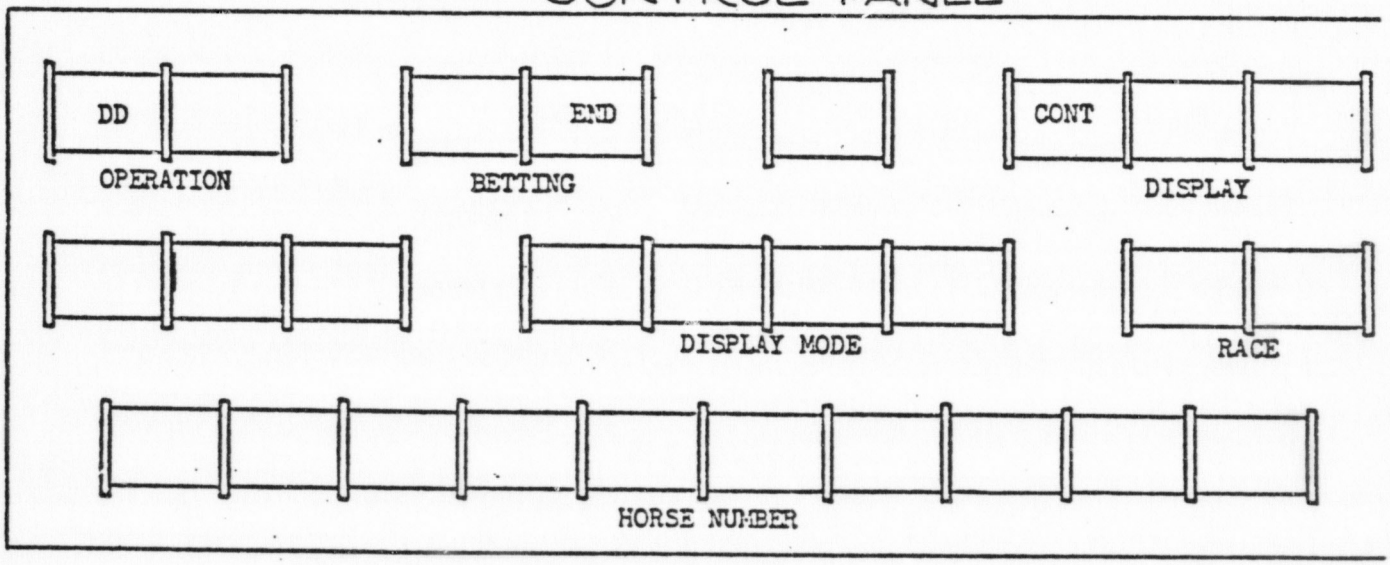


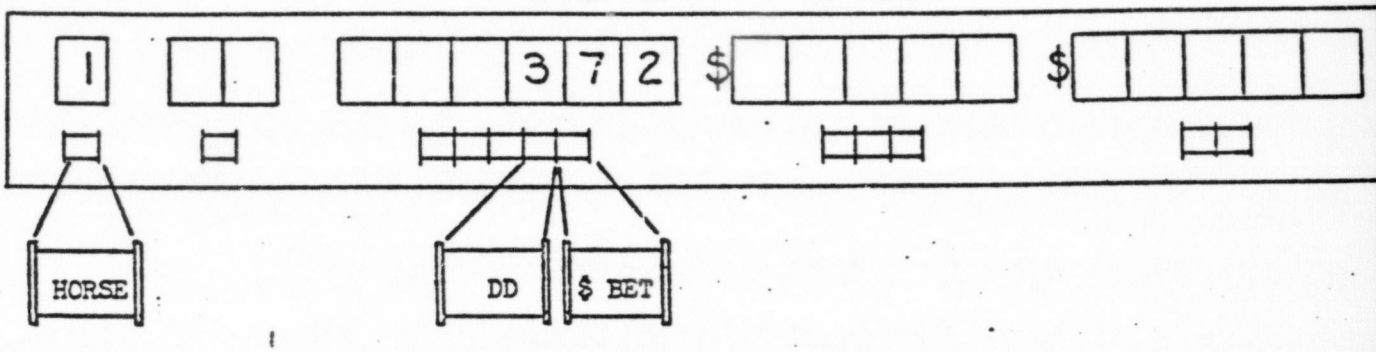
Indicates that the total Daily Double pool is $7532.
(See Sec. 2.2)



Pressing the "End Betting" button during the Daily Double operation automatically displays the Daily Double pool.

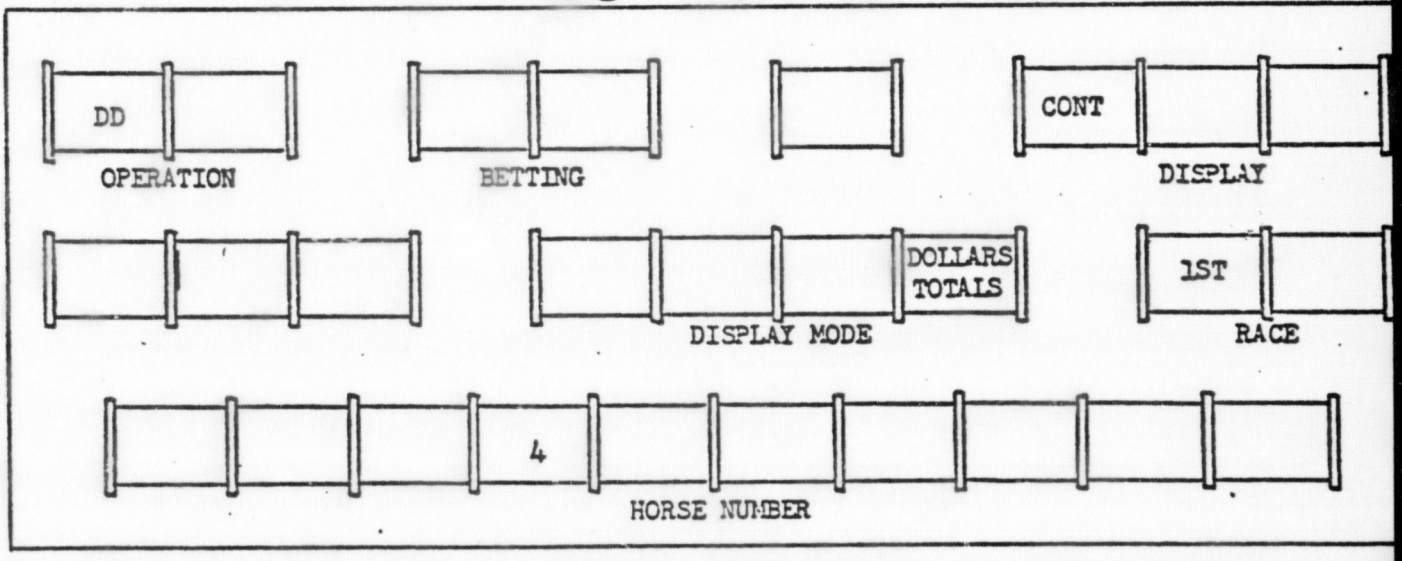
FIGURE 2 DISPLAY OF DAILY DOUBLE POOL

DD DISPLAY PANEL



Shows that the dollars bet on the combination of the 1st race winner horse #4 (see the Control Panel) and horse #1 in the second race is $372. In 3 secs. number 2 appears above "Horse" with a dollars bet amount. This continues automatically through 8 combinations.

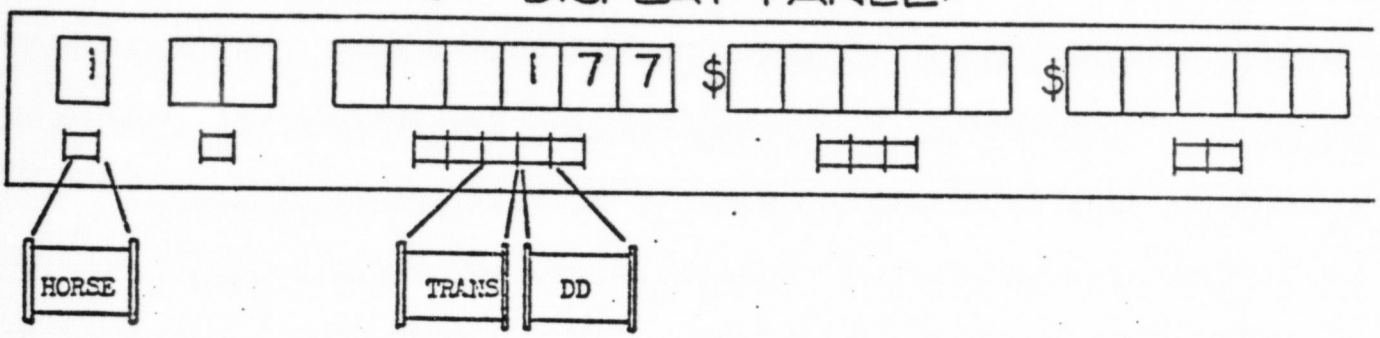
CONTROL PANEL



At the end of the first race (see Sec. 2.3) to obtain a display and print-out of the dollars bet on the combination of the first race winner with each horse in the second race press: (1) "Dollars Total"; (2) "1st Race"; (3) First race winner (assume #4 in above example).

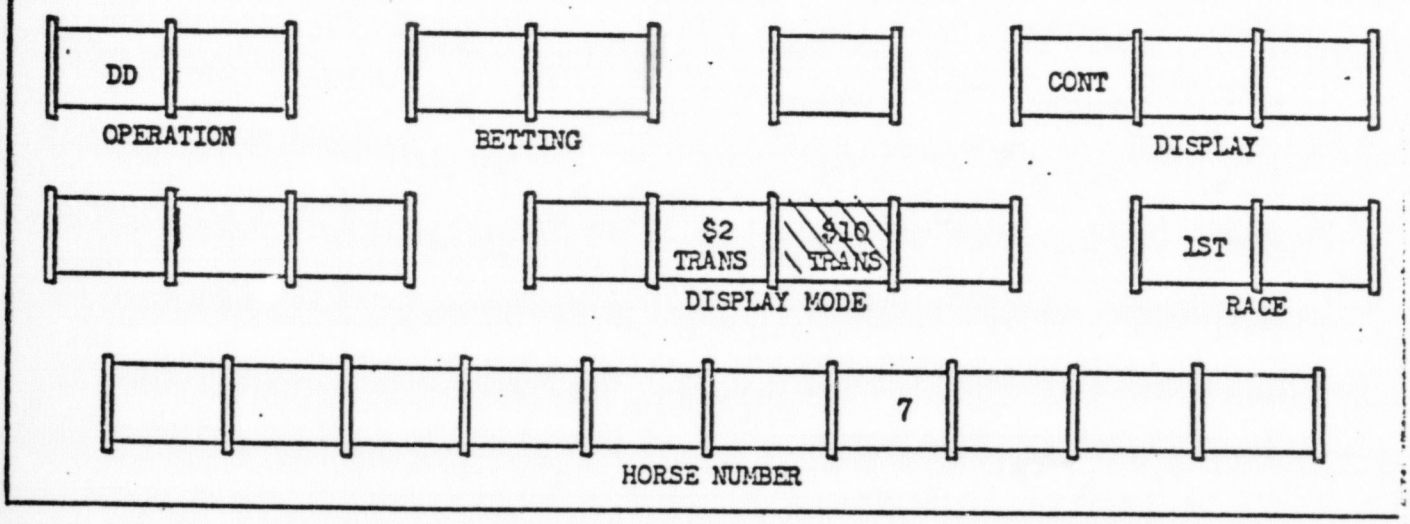
FIGURE 3 DOLLARS BET ON COMBINATION OF 1ST RACE WINNER AND EACH HORSE IN 2ND RACE

DISPLAY PANEL



Shows the total $2 TRANSACTIONS for the combination of the 1st race winner horse #7, and horse #1 in the 2nd race. In 3 seconds #2 appears automatically and the total for the new combination appears. Every 3 seconds the horse number and $2 transactions total changes until all 8 combinations have been displayed.

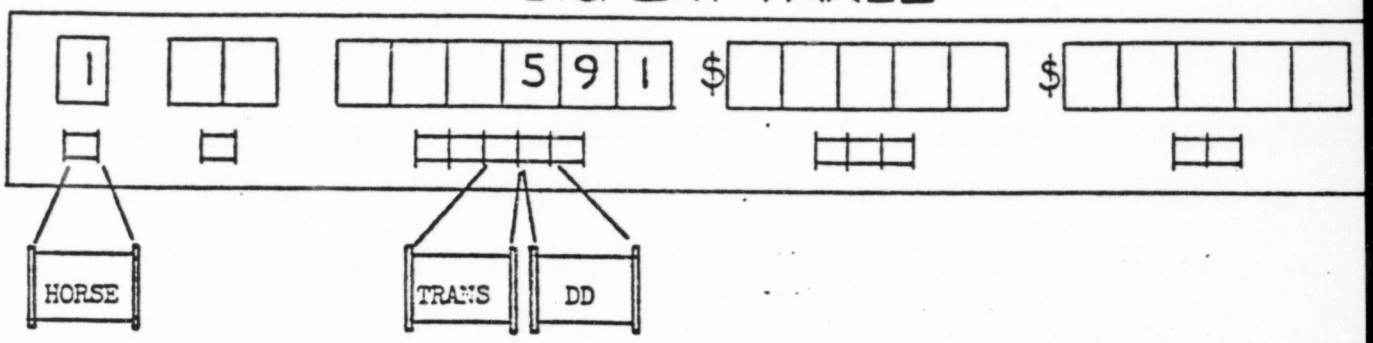
CONTROL PANEL



AT THE END OF THE FIRST RACE to obtain display of total $2 TRANSACTIONS for the combinations of the first race winner with each horse in the second race press: (1) "$2 TRANS" ("$10 TRANS" to get the total $10 transactions); (2) "1ST RACE"; (3) First Race Winner (in above example assume #7).

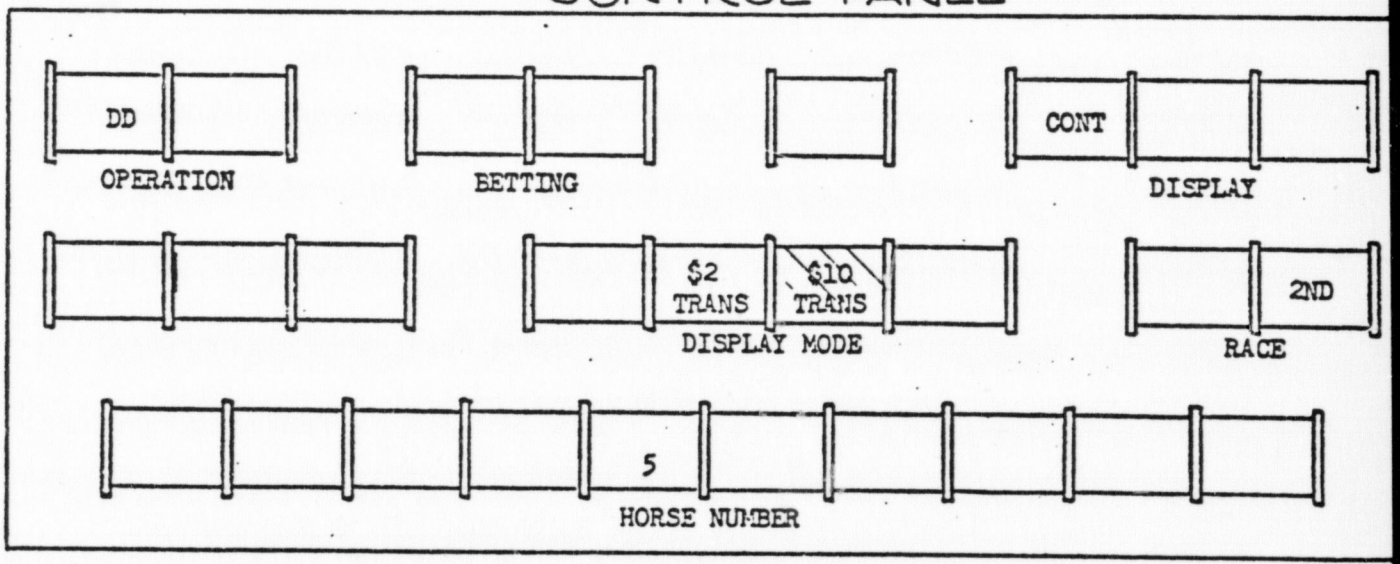
FIGURE 4 TOTAL TRANSACTIONS FOR COMBINATION OF 1ST RACE WINNER + EACH HORSE IN SECOND RACE

DD DISPLAY PANEL



Indicates that 591 $2 transactions have been recorded for horse #5 in the second race in combination with horse #1 in the first race. In 3 seconds a #2 appears and the total will indicate the $2 transactions for horse #5 in combination with horse #2 of the first race.

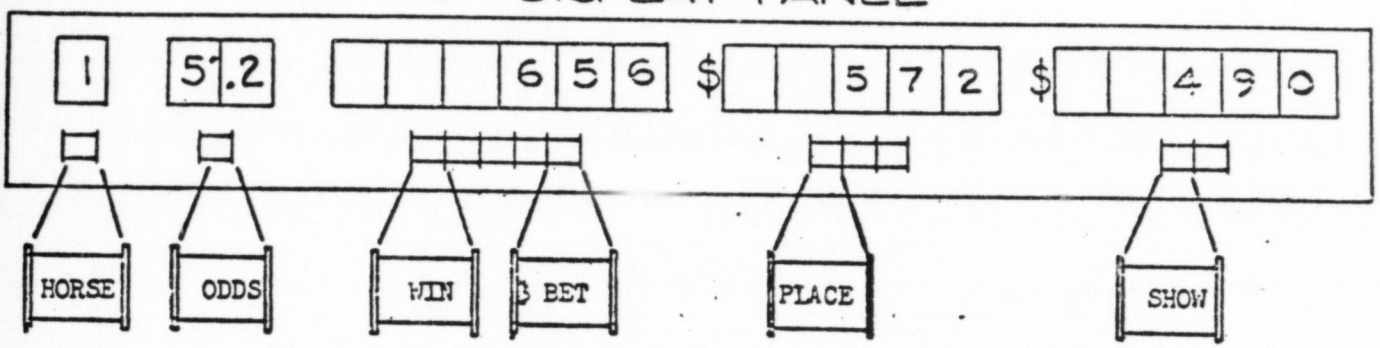
CONTROL PANEL



AT THE END OF THE FIRST RACE: For display and print-out of total $2 (or $10) transactions for a selected horse in the 2nd race in combination with each first race horse, the procedure is the same as described in Figure 4 except that "2ND RACE" button is pressed. Press: (1) $2 TRANS (or $10 TRANS); (2) "2ND RACE"; (3) The number of the selected horse in the second race (assume #5).

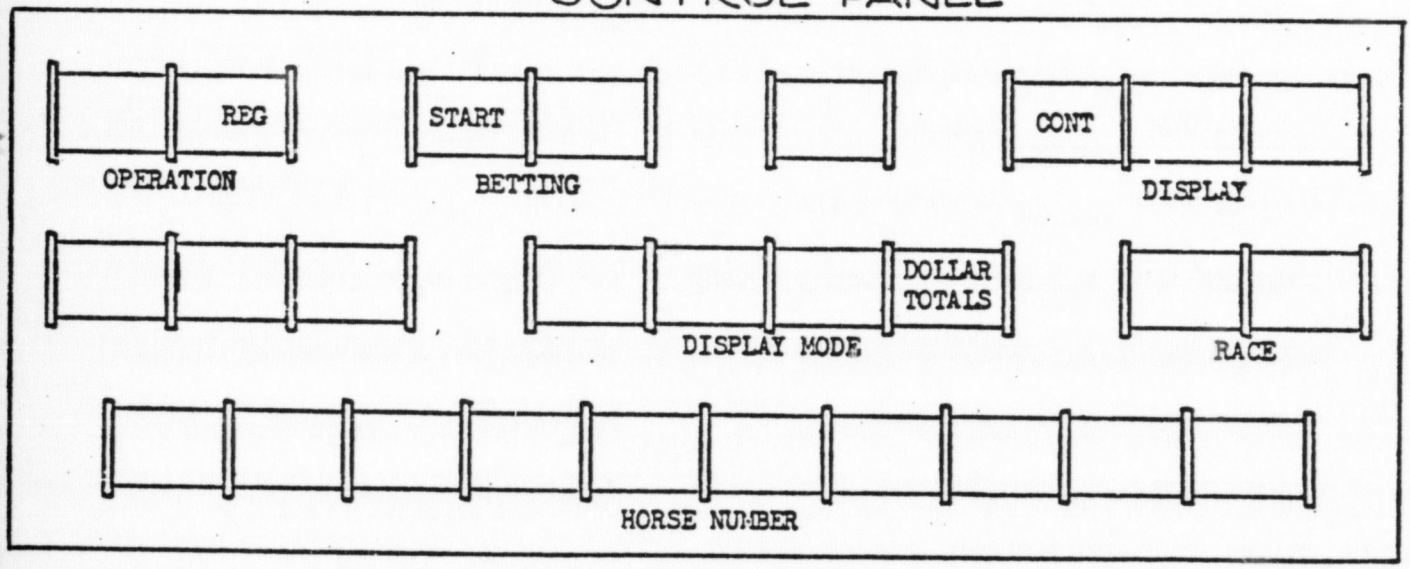
FIGURE 5 TOTAL TRANSACTIONS FOR COMBINATION OF ANY SELECTED HORSE IN 2ND RACE + EACH HORSE IN 1ST RACE

DISPLAY PANEL



Indicates that horse #1 has probable odds of 5 to 2, a total bet of $656 for win; $572 for place and $490 for show. In 3 seconds a "2" appears with the amounts for the second horse. The display continues automatically in sequence for each horse.

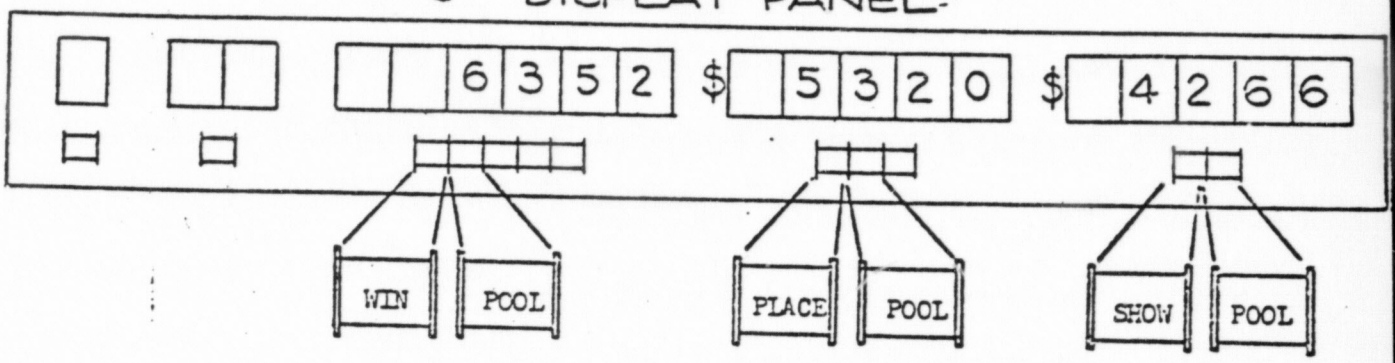
CONTROL PANEL



At the start of betting the Control Panel has the above appearance as a result of pressing the four buttons indicated.

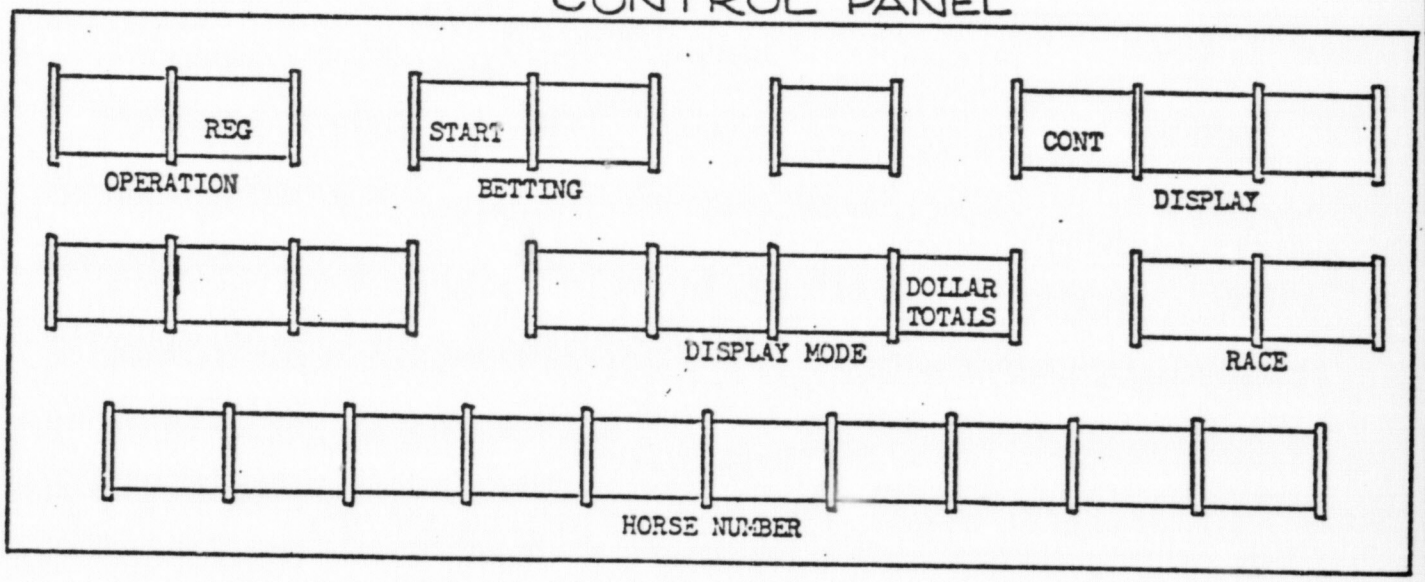
FIGURE 6 PROBABLE ODDS AND TOTALS BET ON EACH HORSE DURING REGULAR BETTING

DO DISPLAY PANEL



DURING BETTING THERE IS NO CHANGE IN THE Control Panel from Figure 6. Total "Win", "Place" and "Show" pools are displayed automatically following the display of the individual horse "Dollars Bet" totals.

CONTROL PANEL



Indicates the total WIN, PLACE and SHOW POOLS in dollars.

FIGURE 7 WIN, PLACE AND SHOW POOLS

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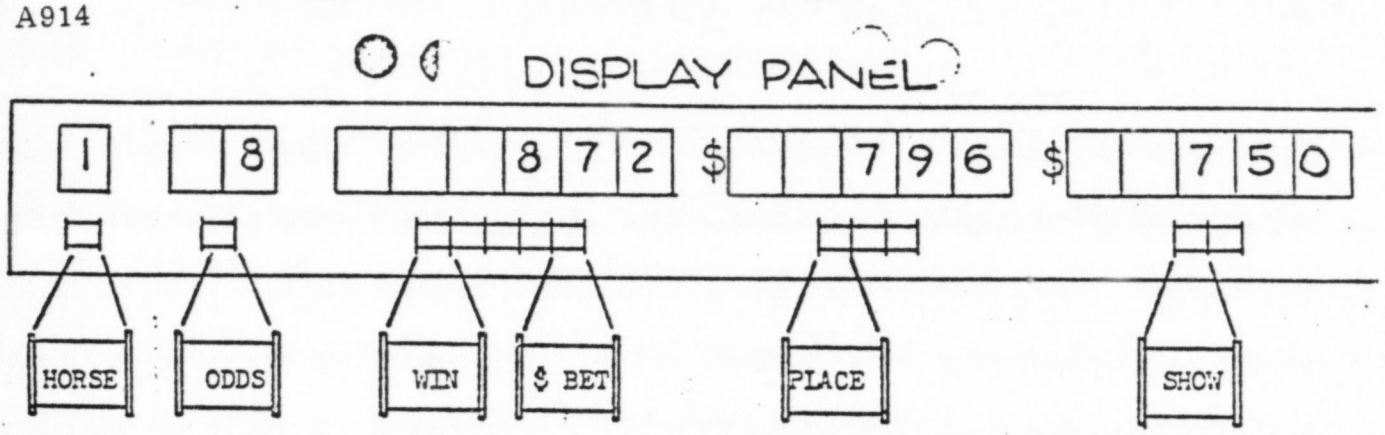
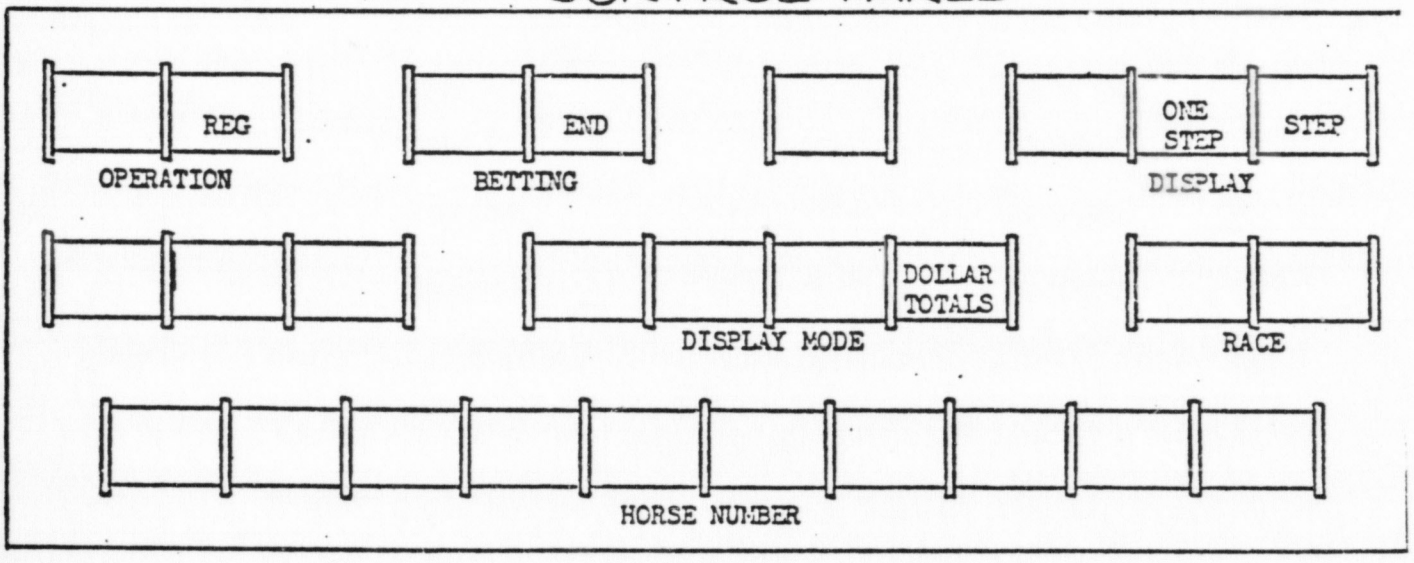


AT THE END OF BETTING (1) Pressing the "End Betting" button discontinues the displays shown in Figures 6 and 7. The same information displayed in Figures 6 and 7 but as of the End of the Betting period can now be obtained under manual control as follows:

Press: (1) "One Step"
(2) "Step"



Indicates in sequence, each time the "Step" button is pressed, the information shown for each horse (as in Figure 6) followed by the total WIN, PLACE and SHOW pools (as in Figure 7).

FIGURE 8 TOTAL WIN, PLACE, SHOW POOLS AND INDIVIDUAL HORSE DATA AFTER THE END OF BETTING

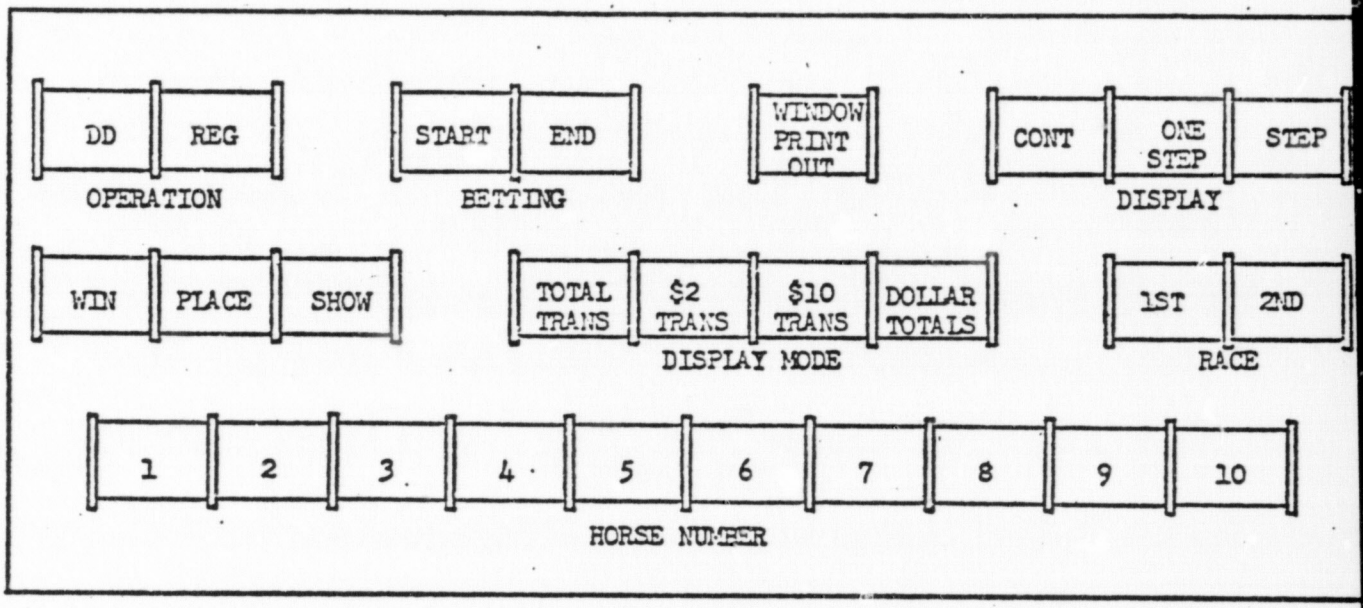


FIGURE 9 COMPLETE CONTROL PANEL

A916

FULLY ELECTRONIC
TOTALIZATOR

PR 9175-2

EXHIBIT B

Presented to:

ROOSEVELT RACEWAYS

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DIGITRONICS CORPORATION
Albertson, L.I., N.Y.
February, 1960

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A918

FULLY ELECTRONIC TOTALIZATOR

1. Function of Equipment

1.1 Machines are to be provided which will allow for the sale of tickets in the denominations of:

$ 2.00
$ 5.00
$ 10.00
$ 50.00
$100.00

plus the combinations of:

$ 4.00
$ 6.00
$ 10.00

for win, place and show positions in the regular betting. In addition machines will be provided for the sale of daily double tickets for $2.00 and $10.00 bets with all of the functions to be in accord with presently used techniques at the Roosevelt Raceway. Each seller of tickets will have available to him such controls and transaction counters as may be required for his checking purposes.

1.2 At the central unit transaction totals will be accumulated in a fully electronic memory. The central unit will also contain the equipment necessary to control the following displays:

1.2.1 For regular racing a continuous display of the total of the win, place, show pools and of the individual horse totals for each pool with the complete display being updated every 70 seconds. The money amounts shown in these displays will be the total amount collected before 15% is removed to create the net pool.

1.2.2 The central equipment will also contain controls to enable the posting, following the completion of the first race, of the possible payoffs for the daily double. These possible payoffs will be computed by the equipment and presented rounded down to the nearest ten cents.

1.3 Central equipment will be capable of calculating and posting the actual odds in the regular win pool of each race. The odds for display will be selected from amongst one of the following categories:

1:9, 1:8.....1:3; 2:5, 1:2, 3:5, 3:4, 4:5, 1:1, 6:5, 7:5, 8:5,
9:5, 2:1, 5:2, 3:1, 7:2, 4:1, 9:2; 5:1, 6:1.....99:1

Calculation of odds will be based upon the net win pool and not the total pool (net pool equals the total amount bet less 15%), and will be an exact calculation based on the true payoffs to be expected.

1.4 The central equipment will contain facilities for a printout of the number of transactions which occur for each horse at each window in the regular betting. This printout can be initiated as soon as betting has been stopped and will be complete in less than 40 seconds following the completion of betting if there are less than 400 active windows in the regular betting setup. Upon demand the central equipment will also be capable of providing a printout of the number of bets placed at each daily double selling machine. In the case of the regular selling machines the printout will accomodate, for each selling machine, a total of ten 3-digit transaction amounts, allowing for 799 bets to be placed on each horse at each machine. An interlock prevents the seller from recording an 800th bet on a given horse. The daily double printout will accomodate sixty-four 3-digit printouts for each machine to allow for an 8 horse daily double operation.

1.5 The central equipment will be capable of automatically computing the payoff at the conclusion of each regular betting period as soon as a winning horse sequence is known. Payoff will be computed rounded down to the nearest five cents. Upon the completion of this calculation the printout, by operation of a particular control, will contain the information as shown in Appendix A-1. Provision will be made for the following categories of race result:

1.5.1 One horse for win, one horse for place, one horse for show.

1.5.2 Two horse dead heat for win, one horse for show.

1.5.3 Two horse dead heat for win, two horse dead heat for show.

1.5.4 Three horse dead heat for win.

1.5.5 One horse for win, two horse dead heat for place.

1.5.6 One horse for win, three horse dead heat for place.

1.5.7 One horse for win, one horse for place, two horse dead heat for show.

1.5.8 One horse for win, one horse for place, three horse dead heat for show.

1.6 Upon the conclusion of the second race of the daily double, the daily double payoff rounded down to the nearest ten cents will be available. The printout data shown in Appendix A-2 will likewise be available. The daily double payoff will be automatically computed if there are two horse dead heats in either the first or second race. In cases of more than two horse dead heats, the daily double payoff will be manually computed. For this purpose, printout of the bet totals by dollar category and by horse will be available.

1.7 The following rules will enable the computational and data gathering speed of the equipment to be determined in any case.

1.7.1 The entire ticket selling array will be scanned four times every second. This includes all regular and daily double selling windows and applies for

an installation of a total of 1000 windows. Daily double windows and regular betting windows are undistinguishable in this operation.

1.7.2 The display updating rate is set at approximately 70 seconds and it will take approximately 1 second to complete each updating on the display boards.

1.7.3 In the normal operation, printout of the number of bets placed for each horse at each window in the regular betting will be accomplished at the rate of ten windows per second. For the daily double betting this rate will be decreased to 0.6 seconds per window.

1.7.4 Computation of payoff will be available in 15 seconds of the punching of the information into the central control units in the most complex of the situations outlined in Sec. 1.5 above. For the daily double a computation of probable payoffs after completion of the first race will require approximately 10 seconds.

1.8 Miscellaneous Features

1.8.1 In the event of a scratch of a horse it will be possible to set a control at the central location such that no selling machine will be allowed to make the transaction involving the scratched horse. Additionally the operation of the scratch button with a horse involved will remove the total pool involving that horse on the probable odds computations or the payoff computations.

1.8.2 In the daily double situation operation of the scratch controls will automatically set up the consolation pool. This pool consists of all money bet on the scratched horse in the second race in combination with each horse in the first race.

2. Description of the Equipment

2.1 The present specifications call for two types of selling machines.

2.1.1 350 regular selling machines will be provided, each one with allowance for 10 horses. The machines will be provided with a single mechanical counter to record the total number of bets passing through the machine for each race. Each machine will contain a paper tape punch so that a complete paper tape record of every individual transaction is available at the window machine. At the central computer will be an electronic circuit which will assign the machine its place in the scanning sequence to be described below. In addition to the 10 buttons describing the horses and the tickets dispensing slot, there will be a button marked "test" and a button marked "release". These are discussed below. A key on each window machine allows the supervisor to control whether or not it is available for betting.

2.1.2 120 daily double selling machines will be provided. Each daily double machine will have two banks of eight keys. At the central computer will be electronic circuitry to define the position of each daily double window in the scanning sequence. Included as well is the paper tape punch, the Total counter and the test and release buttons.

2.2 Each individual window machine will be independently wired to the central location, in order to prevent accident to any cable from affecting any other. A plugboard will be available to assign the window position in the scan sequence, the category of the window ($2 win, $2 place, etc.), and whether or not the machine is to be in use. Changes in assignment may therefore be accomplished by changing the plugboard.

2.3 The window scanning system will be one which is based upon an individual window scan of 100 microseconds (0.0001 seconds) per window. Each daily double window will be treated as two windows. For the plant described in Sec. 2.1 above it can be seen that 65 milliseconds (0.065 seconds) will be required to complete a scan. For the maximum plant of effectively 1000 windows, 100 milliseconds (0.1 seconds) will be required per scan of the entire plant. Every 70 seconds, when the displays are to be updated the required calculations, accumulations and read outs of the registers covering each one of the 10 possible horses in the race occurs. For the maximum plant, this would require an additional 100 milliseconds for a total of 200 milliseconds. To allow for future expansion the scan time is therefor made 250 milliseconds or 4 scans per second. Thus, the longest possible wait between the seller's depression of a selector key for a given horse and a signal back from the scanner unit to allow the issuance of the ticket will be 1/4 second.

Regardless of the placement of a given machine in the physical plant setup the assignment of a window number in the scanning sequence will be such that the first windows scanned will be the $2 wins followed by the $5 wins etc., followed by the $2 place, $5 place etc. through the combination windows and the daily doubles.

The fact that a window machine is locked and unused at a given racing period simply means that the results of all scans involving that window will be a zero accumulation.

2.4 The scanner feeds its information into the central unit. The central memory unit for the accumulation of information is actually two units. One can be called the "window" memory. It accumulates the total transactions for each horse at each window for the regular and daily double betting. This provides the information for the high-speed printer (Sec. 2.4.5).

The other is the "pari-mutuel" memory. It accumulates information for each category of bet, enabling the computation of dollar amounts which provides the information for the lister printout (see Fig. A-3). In the central unit, all pari-mutuel calculation components are duplicated and each computation is done twice with the results being compared with a previous computation of its own section as well as the computation of its duplicate section of the machine. In addition data is checked into and out of the memory.

The machine operator, by operating the appropriate control on the console can bypass a defective section of the dual machine for repair while the rest of the machine continues its operation. An additional safeguard is afforded by the "window" memory which serves as an additional spare. The amounts bet can be calculated, if necessary from the transactions per horse per window information (see Fig. A-4 and A-5). As a further safeguard, each window machine contains a historical record of all transactions on a strip of punched paper tape. This information can be totaled on an offline basis in the "off-line window totalizer" (see Sec.).

2.4.1 The basic unit for the entire machine is the timer unit which enables data into and out of the memory and causes the selection of the appropriate window machine for interrogation during the window scan. During computation, the timer arranges for a different sequence of accesses to the memory, as required by the computational procedure.

2.4.2 During a scan, as a given window is examined the selected horse number will include a check signal. In the central unit this check signal will be examined. If the check signal is satisfactory and further, if the computation which results in the central unit as a result of receiving this signal is satisfactory, a "CONFIRM" signal is sent back to the ticket selling window machine. Receipt of the "CONFIRM" signal allows the window selling machine to issue its ticket. If the "CONFIRM" signal is not received the window selling machine is locked up. This may occur in the event of a mechanical defect in the machine or in the event that the ticket requested has been on a horse which has been scratched.

2.4.3 Memory will be of the coincident current magnetic core type. A memory arrangement will accomodate a total of 12 bits of which eleven are used for data and one as a parity check. Each time a total comes from a mem-

ory it is checked for an odd number of bits as well as for identity of the quantity being read out of the duplicate memory.

2.4.4 As indicated above once every 70 seconds during the constant scanning of the memory a computation of the odds is performed. Bets are translated into dollars as the computation occurs. The $2 wins, $2 places, $2 shows, $5 winds, $5 places, etc. are grouped together in the parimutuel memory. In this way, over a single region of the memory, each quantity is accumulated and then multiplied by the appropriate dollar amount, giving the money total for each pool. Following this aggregation the net pools are calculated by multiplying by 0.85 and the computation necessary to obtain the raw odds is completed (see Fig. C-1). For all raw odds greater than or equal to five the result is rounded down to the nearest whole number and displayed in that fashion. For odds that are less than five, the matching operation occurs to establish which of the groups listed in Sec. 1.3 above best fit the actual odds. These results are then made available to display.

2.4.5 When the betting is completed and printout is desired, the output of the window memory controls a high-speed 48-column line printer. The first 3 columns in each line includes a window number according to the scanning sequence. Following a space there are 40 columns composed of ten groups of three digits plus a space, each one of which represents the number of bets taken on each of the ten horses at the window being printed (see Fig. A-4).

2.4.6 For daily double, printout configuration is similar (see Fig. A-5) except that the first three columns may be used only once every eight lines and there are eight groups of 4 columns (3 digits and a space) each across the page. Thus for each daily double window there is an array of 8 x 8 transactions. The first line indicates the amount bet on each of the 8 horses in the second race in combination with the first horse in the first race. The 8th line represents the amount bet on each of the 8 horses in the second race with the 8th horse in the first race. There is one such printout for each window at the conclusion of the daily double operation.

2.4.7 The printout equipment is duplicated, so that there is fallback equipment against possible breakdown in the high speed printer.

2.5 Display Equipment – there are three different types of display equipment available in the proposed system. First is a complete display which is available in the calculating room. Second is the infield display board which is visable across the track from the grandstands and third, a number of odds displays at various points in the stands.

2.5.1 Calculating room displays will be of the projected illuminated plug-in numeral type. Arrangements will be made so that no numeral frame should ever be blank. In this way failure of a light will be detected immediately and the numeral unit replaced.

2.5.1.1 The regular betting display will consist of 20 indicators arranged in a horizontal line (see Fig. B-1) such that the first two indicators can be used to indicate the odds, and the next 6 the total amounts of money bet on each horse for win. The next 6 the total amounts bet on each horse for place, and the last 6 the total amounts bet on each horse for show. Each group of 6 indicators also display the total pools. The win, place and show displays are obtained separately on demand by operation of individual controls for each category, in the calculating room.

2.5.1.2 The payoff display for the daily double will consist of a single horizontal line of seven indicators. Two of the digits will be devoted to horse number and five digits to payoff. Thus for a daily double a maximum possible payoff can be indicated of up to 9999.90 dollars (the last zero will not be a variable).

2.5.1.3 As soon as the first race winner is known and payoff is computed (see Sec. 1.7.4), the display (see Fig. B-2) of the payoff of each combination can be obtained on demand by operating the controls in the calculating room.

2.5.1.4 The payoff display in the calculating room for the regular betting will be a duplicate of the payoff display section of the infield board. It will appear automatically as it is computed as described in Sec. 1.7.4 (see Fig. B-3).

2.5.2 The infield display will be of the type in which individual letters are made up out of incandescent lamps arranged in a four by six rectangular array. The infield board will contain provision for display of the same numbers during regular betting as described above for the total display. However, in the case of the infield board the win odds and totals for all horses as well as the totals for all pools will be on display simultaneously and continuously. This requires 216 digits (see Fig. B-2 and B-5). In addition on each of two separate boards there is provision for 8 groups of 5 digits each to indicate the probable payoff in the daily double. There will also be a separate display line for the payoff of the winning combination (see Fig. B-4). The infield board includes the ability to manually overcome the display of any digit from the field. This will insure that the display conforms to the figures in the central unit.

2.5.3 The display on the infield board of final payoff amounts is controlled from the central unit.

2.5.4 All auxiliary displays will generally be limited to regular betting win odds. There will be two types available. A more complex display in which the win odds for all ten horses are displayed simultaneously and a simplified display wherein the win odds for the regular betting are displayed in sequence in steps with the scanning of the regular betting on the tote room indicators. There will be 7 complex displays and 1 simplified display (see Fig. B-6).

3. Operation of the Equipment

3.1 In order to initiate the betting operation the operator at central controls must press the START BET control button thus allowing issuance of tickets by betting machine. This clears the memory and initiates the scanning of all windows. A separate DAILY DOUBLE switch is operated so that the daily doubles selling machines can issue tickets.

3.2 As scanning proceeds probable odds and money totals are displayed as was discussed in the previous Sec. 2.5.

3.3 In order to stop the operation the judges use the END BET control button. This stops the scanning operation and makes it impossible for any ticket selling machine to dispense any more tickets.

3.4 In the event that a horse is scratched at any time it is necessary only to depress the button for that horse number under the group of buttons marked SCRATCH. Once such a button has been depressed it will be impossible for any selling window to issue a ticket for that horse.

3.5 At the end of betting for the first race the operators will use the WINDOW PRINTOUT-REGULAR control button to initiate the listing of the individual horse transactions at each selling machine on the central high-speed printer. This process will take approximately 35 seconds under normal conditions. In the case of failure see Sec. 3.9 below. The format of the window printout has been discussed earlier and appears in Fig. A-4. At the same time a printout occurs on the lister of amounts bet on each horse in each category by bet amounts. This printout is shown in Fig. A-3.

3.6 At any time following the end of betting, the operator can demand a printout on the lister of the amounts bet on each combination, in each category by bet amounts. This printout is shown in Fig. A-6.

3.7 Following the window printout and after the race has been run, an indication is given of the finishing order of the various horses. The operator can press the WIN button, one or more of the HORSE buttons (more than one is pressed in the case of a dead heat) and the CALCULATE button. The result will be to display, in the calculating room, the payoff rounded down to the nearest five cents on the winning horse or horses. The same procedure is followed for place and show and these amounts are added to the display as shown inFig. B-3. At this time the printout on the lister occurs as shown in Fig. A-1.

3.8 The operator now uses the DAILY DOUBLE PAYOFF button, the horse number button and the CALCULATE button to initiate display and printout of the probable payoff for each of the second race horses with a winner of the first race. The display is shown in Fig. D-2 and the printout in Fig. A-2.

3.9 Upon completion of all this the operator may then call for the daily double window printout by operating the appropriate button and receive the printout in the format discussed above in Sec. 2.4. This process will take approximately 3 minutes.

3.10 A plugboard in the central control room determines the bet category and denomination of a window and can be used to disable a given window.

3.11 A breakdown in the central system which cannot be corrected by the spare calculating and printing facilities which are included in it will require fallback to the punched paper tapes at each window machine. These are fed into the "Off-Line Window Totalizer" which consists of a high speed paper tape reader and accumulating facilities. This equipment will provide totals by window and by category ($2 win, $2 place, etc.). In this case, calculations will be made manually.

4. Physical Description

4.1 At the central location is the electronic data gathering, calculation and control equipment, and display and printout units.

4.1.1 The electronic memory and calculation circuits are housed in 10 racks. In addition one of the racks includes the plugboard which can be arranged to determine the value and nature (i.e. win, place, show, etc.) of the ticket dispensers. For convenience in test and handling, each rack will have the following dimensions: 5 1/2 ft. (height) x 22 in. (width) x 24 in. (depth). In operation the racks are normally bolted together. The interwiring between these racks however is such that they may be separated and "folded" so as to fit into standard elevators, pass through doors, etc.

4.1.2 Scanning will be done by a central electronic scanning unit.

4.1.3 A control console of desk height will be provided to give operator control over the various displays and printouts already described. The console will include switches, buttons and associated indicators in arrangement for convenient operation. In addition the following equipment will be placed so as to be visible and convenient to the operator.

4.1.3.1 A high-speed 40-column printer to provide the printouts described in Sec. 1.4, 1.5, 2.4.5 and shown in Fig. A-4 and A-5. This unit will operate at a speed of 600 lines per minute.

4.1.3.2 Two lister type printers provide a 10-column, 3-line per second printout. Normally these listers print out the information described in Fig. A-1, 2, 3, 6 and 7.

The listers also can serve as standby units to replace the operation of the high-speed printer. This operation has already been described in Sec. 2.4.7.

4.1.3.3 A spare high-speed printer will be available.

4.1.3.4 A perforated tape reader, the primary function of which is to read the tape and cause the printout on the listers during off-line totalizing.

4.1.4 The calculating room display equipment has 100 indicators of the projected numeral type. The calculating room has three separate control boxes to select the horse and amounts bet in each category as well as the total pool amounts.

4.2 The equipment provided for the infield display boards will fill all the holes existing in the present regular betting and daily

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double units (see Fig. B-4 and B-5) and includes controls by the central station.

4.3 The numerals and symbols with appropriate controls from the central station will be supplied for the existing auxiliary displays (see Fig. B-6).

4.4 350 regular and 120 daily double ticket dispensing machines will be provided to the following specifications:

4.4.1 Ticket

4.4.1.1 The ticket dimensions are to be 2" x 3 3/16" long.

4.4.1.2 The ticket should be fed out of the machine with print side up and date printed first.

4.4.1.3 The ticket should be extended out of the exit slot for ease of handling.

4.4.1.4 The cutting edge should be smooth.

4.4.1.5 The ticket should be held in slot after issuing by friction.

4.4.2 Inking Device

4.4.2.1 A wet inking device shall be applied when the wet ink rolls onto the type wheels just before printing.

4.4.2.2 The ink should be of the quick-drying type.

4.4.2.3 The print applying roller should be away from the type face when not in operation.

4.4.3 Ticket Advance Device

4.4.3.1 The ticket should be fed to the printing position and then cut off.

4.4.3.2 Friction type wheels should be used to advance tickets to the print position.

4.4.3.3 The rotary type printing device should contain friction fed edges which would advance the tickets to the outside of the case while at the same time print the tickets.

4.4.4 Printing Device

4.4.4.1 A rotary print device should contain the date wheels, horse identification number and fixed and movable slugs.

4.4.4.2 The horse identification number wheel should be automatically positioned by means of a solenoid and controlled by the keyboard.

4.4.4.3 The race number identification wheel should be automatically positioned by means of a solenoid and controlled remotely by wire connection.

4.4.4.4 The coding slug should be designed to be readily removable.

4.4.4.5 Racetrack facility and amount should have a fixed slug mounted with screws or other approved method.

4.4.5 Ticket Roll Storage

4.4.5.1 Tickets shall be roll type with the roll having a capacity equivalent to the diameter of 10 to 12 inches.

4.4.5.2 Access should be from the top of the table by hinging the entire assembly to the table top.

4.4.5.3 The threading or loading of the ticket rolls should be simple, convenient and require no tools.

4.4.6 Control Button Assembly

4.4.6.1 Twelve buttons should be provided near the front edge closest to the ticket seller. One of the buttons should be used only as a test button.

4.4.6.2 Each button should control five (5) normally open contacts.

4.4.6.3 Buttons should be interlocked so that only one button may be depressed at one time.

4.4.6.4 The button should return automatically at the end of each issuing cycle.

4.4.7 Case

4.4.7.1 The mechanism should be contained in a tamper-proof case and protected with a high grade, high quality lock.

4.4.7.2 The case must be dust-proof and water resistant.

4.4.8 Material

4.4.8.1 The top plate should be made from stainless steel heavy enough to carry the load of the entire mechanism.

4.4.8.2 Only new and highest quality material should be used for all electrical and mechanical components.

4.4.8.3 The mechanism should be designed and built for a minimum operation of 500,000 cycles.

4.4.9 Electrical Requirements

4.4.9.1 One hundred and ten volt, 60 cycle A.C. should be used except for the horse number stepping device which should be operated from a 60V D.C. supply.

4.4.10 Speed of Operation

A ticket issuing cycle should not exceed 3/4 of a second.

4.5 A closed circuit TV, and including two monitors for the control and calculating rooms. Monitors to have 24" screens.

5. Acceptance

5.1 The acceptance procedure is designed to demonstrate the ability of the equipment to perform the functions described in these specifications and also to demonstrate the reliability of the installation. The basic principle of the test is to simulate actual racing conditions at the point of installation, by requiring actual operation of the selling machines. For this purpose a skeleton selling crew will be brought in and each man will be given a schedule of betting entrees to be made on several selling machines. In this way the whole plant can be tested with known input data. A second type of test not requiring the presence of the skeleton crew, will bypass the selling machines and simply check the accuracy and reliability of the central computing device. This will be done by feeding predetermined bet totals into the memory which stored the betting by dollar category for each horse for each pool.

5.2 A number of punched paper tapes will be prepared with information in the following sequence:

a. Number of $2 Wins on Horse #1
b. " " $2 Wins " " #2
c. " " $2 Wins " " #3, etc. to
d. " " $2 Wins " " #10
e. " " $5 Wins " " #1
f. " " $5 Wins " " #2, etc. to horse #10
g. " " $10 Wins " " #1, etc. to horse #10
h. " " $50 Wins " " #1, etc. to horse #10
i. " " $100 Wins" " #1, etc. to horse #10
j. Repeat of sequence a through i above for the Place pool
k. Repeat of sequence a through i above for the Show pool
l. Number of $4 Combinations on Horse #1, etc. to horse #10
m. " " $6 " " " #1, etc. to horse #10
n. " " $10 " " " #1, etc. to horse #10

These tapes will be fed into the central machine unit by way of the perforated tape reader. Assuming that each of the above entrees averages four digits, each tape would then contain 720 digits. This can be read in less than 10 seconds. Therefor a new tape can be entered during the periods between the 70 second probable odds display updatings. Each tape entered will change the probable odds, horse dollar totals and pool dollar totals to a new amount which can be precalculated. The updated displays must agree with the precalculated amounts. Twenty such tape inputs will be considered equal to one race. This procedure constitutes test type A.

5.3 At the conclusion of each run of test type A a lister printout will occur as required. For each "Race", three result sequences will be chosen from those in Sec. 1.5 and thus three different lister printouts will be produced and checked against the precalculated results. This procedure constitutes test type B.

5.4 A number of punched paper tapes will be prepared with information in the following sequence:

(1-1) Number of $2 Daily Doubles on Horse 1 in the first race and Horse 1 in the second race.

(1-2) Number of $2 Daily Doubles on Horse 1 in the first race and Horse 2 in the second race.....etc. to

(1-8) Number of $2 Daily Doubles on Horse 1 in the first race and Horse 8 in the second race.

(2-1) Number of $2 Daily Doubles on Horse 2 in the first race and Horse 1 in the second race.

(2-2) Number of $2 Daily Doubles on Horse 2 in the first race and Horse 2 in the second race.....etc. to

(8-1) Number of $2 Daily Doubles on Horse 8 in the first race and Horse 1 in the second race.....etc. to

(8-8) Number of $2 Daily Doubles on Horse 8 in the first race and Horse 8 in the second race.

This sequence will then be repeated for the $10 Daily Double betting entrees.

These tapes will be fed into the central machine unit by way of the perforated tape reader. Assuming that the average entry above consists of two digits, each tape would contain 512 digits. Again twenty such tapes will be considered equal to one "Race". At the end of the second race the lister printouts are observed. These observations must agree with the precalculated amounts. This procedure constitutes test type C.

5.5 The preceding tests allow checking of the memory and computation circuits. The selling operation can be checked only by having data entered by means of the actual selling machines. It is necessary for the input rate as well as the accuracy and reliability

to be checked. Test procedure D is intended to check the ability of the equipment to handle peak volume. A full complement of selling personnel will be brought in for this test. Each seller will be given a prepared list of bets which he is to enter into his machine as fast as tickets can be dispensed. (This maximum rate is approximately 3/4 second per ticket.) In order to check the seller the prepared list of bets will consist of a reel of perforated stubs with each stub containing a horse number. A further check on the seller will be the operation of the total transaction counter in each selling machine. At the conclusion of each "betting" period, the high-speed window printout will be operated. At least one time in each ten such periods the window printout will be directed to the high-speed tape perforator rather than to the high-speed printer.

5.6 At the end of each test procedure D the observations of test types B and C will be repeated.

5.7 Nature of Errors

Two processes are occurring simultaneously in the operation of the Electronic Totalizator system. The first involves accumulation of the number of bets for each denomination for each horse and (in the case of the regular betting only) for each pool. The second involves accumulation of the number of bets for each horse at each selling machine. The first process is subject to a four-way check since it is done by two computing sections each of which checks against itself and against the other. The second process is subject to only a two-way check since it does each operation twice and thus checks against itself. The first process is used to determine the pari-mutuel betting operation and can not allow any error or down-time. Every transient error of one section of this operation must be detected and brought to the attention of the operator. However, the machine must automatically select the section which is providing the correct answer and establish the correct answer in both sections. Thus a transient error may occur, be detected and corrected by the computer and thus be classed as a "detected and corrected" error. If, in this first process, one side fails to operate completely, it will continually report errors to the operator and can be taken out of action by operator intervention. Such an event is classed as an "outage" error. During an outage the pari-mutuel section of the machine will be operating on the same basis as the window totals section of the machine. That is, it will be performing each computation twice and checking the second result against the first. Any error which is detected must be reported, in detail, to the operator while the window scanning process goes on uninterruptedly. An error report consists of a printout on the lister of the window number and horse number involved in the error. This is classed as a "detected and reported" error. An error transaction is never entered into the totalizing memory. Thus, a window with a defective machine may continually report defective data which will not be acceptable to the computer. Such a window will be automatically locked up every time it is scanned regardless of the sellers efforts. This will be classed as a "window lock-up" error. Failure of a window to issue tickets properly even though it reports each transaction properly

will be classed as a "mechanical" error.

5.8 Acceptance Test Procedure

Test type A will be repeated for 200 "races". For each of these races, test type B will be performed at the conclusion of test type A.

Test type C will be performed simultaneously with every other performance of test type A for a total of 100 "races".

Test type D will be repeated for 20 "races" each evening the selling force is brought in.

At the discretion of Roosevelt Raceways and without prior warning, "scratches" may be announced for any of the above tests.

At the discretion of Roosevelt Raceways at the conclusion of the "betting" periods, the "results" of the race may be announced. Any result combination acceptable under Sec. 1.5 will be automatically handled.

The acceptance test will include 15 days of actual racing.

5.9 Criterion of Acceptance

The basic acceptance period is defined as one race.

There may be no more than:

a. 10 "detected and corrected" errors during one race
b. 1 "detected and reported" error during one race
c. 1 "outage" error in one hundred races for either the pari-mutuel or the window total section
d. 2 "window lock-up" errors per race
e. 2 "mechanical" errors for any five races

In any eventuality except total loss of power in the plant or physical destruction, accidentally or otherwise, of equipment, no more than 12% of the selling windows are permitted to be unavailable for operation at any one time.

If during the course of the acceptance test any of the above criteria are not met, the entire test is to be rescheduled unless such rescheduling will interfere with normal business of the Raceways.

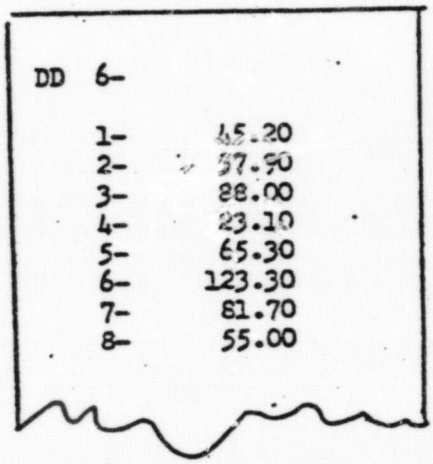
5.10 Upon successful completion of the tests of Sec. 5.8 above as per the criteria of 5.9 above the Electronic Totalizator will be deemed accepted.

WN			(Win Pool Computation)
SC		.00	(Late Scratches)
T		489,874.00	(Total Win Pool)
CM		73,481.10	(Commission)
NP		416,392.90	(Net Pool)
PY		416,007.65	(Total Payoff on Winning Tickets)
BR		385.25	(Breakage)
		.00	(Proof)
PY	6-	8.45	(Payoff for winning horse number 6,
		21.10	for the $2, $5, $10, $50 and $100
		42.25	bets,)including combinations.)
		211.25	
		422.50	(In the event of a dead heat, this printout is repeated for the second horse involved.)
PL			(Place Pool Computation)
SC		.00	(Late Scratches)
T		397,565.00	(Total Place Pool)
CM		59,634.75	(Commission)
NP		338,930.25	(Net Pool)
PY		338,985.50	(Total Payoff on Place Tickets)
BR	-	55.25	(Breakage -Note the minus pool)
		.00	(Proof)
PY	6-	4.40	(Payoff for winning horse number 6 for
		11.00	the $2, $5, $10, $50 and $100 bets.)
		22.00	including combinations.)
		110.00	
		220.00	
PY	3-	3.80	(Payoff for placing horse number 3 for
		9.50	the $2, $5, $10, $50 and $100 bets.
			(In the event of a dead heat, this printout is repeated for the horses involved.)

The Show Pool Computation Printout is similar to the Place Printout except that three horse payoffs are shown.

C		4.00	(Combination Payoff Computation)
PY	6-	11.40	(Payoff for $4 Comb. on Winning Horse.)
	3-	8.50	(Payoff for $4 Comb. on Place Horse.)
C		6.00	
PY	6-	14.85	(Payoff for $6 Comb. on Winning Horse.)
	3-	10.15	(Payoff for $6 Comb. on Place Horse.)
	5-	3.60	(Payoff for $6 Comb. on Show Horse.)
C		10.00	
PY	6-	28.50	(Payoff for $10 Comb. on Winning Horse.)
	3-	21.25	(Payoff for $10 Comb. on Place Horse.)

Figure A-1. Regular Betting Printout of Payoff Computation.



DD 6-

1- 45.20
2- 37.90
3- 88.00
4- 23.10
5- 65.30
6- 123.30
7- 81.70
8- 55.00

(Daily Double Horse #6 has won the first race.)
(Probable payoffs for horse #6 in the first race with each of the horses in the second race.)

Figure A-2 Probable Payoff for each Second Race Horse with Winning Horse in the First Race - Daily Double Printout (Available after the first Race has Ended.)

WN		2.00
	1-	15,694.00
	2-	9,776.00
	3-	8,402.00
	4-	10,866.00
	5-	7,280.00
	6-	2,002.00
	7-	5,874.00
	8-	8,994.00
	9-	3,500.00
	10-	5,246.00
T		77,614.00
WN		5.00
	1-	3,455.00
	2-	10,670.00
		.....
	10-	9,895.00
T		58,240.00
WN		10.00
	1-	7,890.00
	2-	5,760.00
		.....
	10-	8,390.00
T		45,200.00
WN		50.00
	1-	4,050.00
	2-	7,000.00
		.....
	10-	3,650.00
T		33,250.00
WN		100.00
	1-	5,400.00
	2-	4,800.00
		.....
	10-	2,700.00
T		25,800.00
WN	1-	36,489.00
WN	2-	38,006.00
		.....
WN	10-	29,791.00
T		489,874.00

C		4.00
	1-	2,436.00
	2-	2,012.00
		.....
	10-	1,968.00
T		18,844.00
C		6.00
	1-	4,896.00
	2-	3,728.00
		.....
	10-	2,284.00
T		24,256.00
C		10.00
	1-	4,570.00
	2-	3,530.00
		.....
	10-	7,250.00
T		22,048.00

For Place, the above is repeated with "PL" instead of "WN"
For Show, the above is repeated with "SH" instead of "WN".
The right hand columns above, which show the printout totals for combination betting follow the Show Printout.

Figure A-3. Regular Betting Printout Of the Pari-Mutuel Totals.

WINDOW #	HORSE 1	2	3	4	5	6	7	8	9	10
001	246	175	242	163	284	272	169	172	161	191
.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.
135	379	48	326	176	135	221	26	216	117	211
136	127	271	19	200	305	96	101	161	171	121
.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.
350	167	215	115	45	54	169	141	372	300	212

Figure A-4 Regular Betting Printout of Number of Bets on Each Horse at Each Window

WINDOW #	Second Race Horses 1st	2nd	3rd	4th	5th	6th	7th	8th	
001	271	372	127	261	139	77	277	119	(Horse 1 Race 1)
	165	172	271	265	391	222	111	121	(Horse 2 Race 1)
	256	217	179	115	166	199	152	155	(Horse 3 Race 1)
	.	.	.	.	.	.	.	.	. . .
	.	.	.	.	.	.	.	.	(Horse 8 Race 1)
002	143	172	171	115	151	142	143	174	(Horse 1 Race 1)
	165	177	172	151	232	214	391	372	(Horse 2 Race 1)
.	.	.	.	.	.	.	.	.	. . . .
.	.	.	.	.	.	.	.	.	. . . .
120	167	324	243	311	333	214	216	261	(Horse 1 Race 1)
	.	.	.	.	.	.	.	.	. . . .
	.	.	.	.	.	.	.	.	. . . .
	176	234	167	131	313	124	162	114	(Horse 8 Race 1)

Figure A-5 Daily Double Printout of Number of Bets on Each Combination at Each Window

DD	2.00	(Daily Double $2 Computation)
T	357,866.00	(Total Daily Double $2 Bets)
WN	6-	(Horse #6 is first race winner)
	1- 12,548.00	(Total $2 bets on second race horse 1 with #6
	2- 14,944.00	" " " " " " 2 with #6
	3- 9,866.00	" " " " " " 3 with #6
	4- 11,832.00	" " " " " " 4 with #6
	5- 8,546.00	" " " " " " 5 with #6
	6- 17,256.00	" " " " " " 6 with #6
	7- 10,570.00	" " " " " " 7 with #6
	8- 6,582.00	" " " " " " 8 with #6
T	92,144.00	" " " " all second race horses and #6)
DD	10.00	(Daily Double $10 Computation)
T	369,400.00	(Total Daily Double $10 Bets)
	1- 13,620.00	(Total $10 bets on second race horse 1 with #6
	2- 9,220.00	" " " " " " 2 with #6
	3- 8,540.00	" " " " " " 3 with #6
	4- 15,240.00	" " " " " " 4 with #6
	5- 13,200.00	" " " " " " 5 with #6
	6- 10,870.00	" " " " " " 6 with #6
	7- 8,570.00	" " " " " " 7 with #6
	8- 9,560.00	" " " " " " 8 with #6
T	88,820.00	" " " " all second races horses and #6)
DD	727,266.00	(Total Daily Double Pool)

Figure A-6 Daily Double Pari-mutuel Totals Printout
First Race Winner with $2 and $10 Bets for
Second Race Horses.

DD		(Daily Double Computation)
SC	.00	(Consolation Pool)
T	727,266.00	(Total Daily Double Pool)
CM	109,089.90	(Commission)
NP	618,176.10	(Daily Double Net Pool)
PY	617,042.60	(Total Payoff of Winning Tickets)
BR	1,023.50	(Breakage)
	.00	(Proof)
PY	2.00	
	112.80	(Payoff for $2 tickets)
PY	10.00	
	564.00	(Payoff for $10 tickets)

Figure A-7 Daily Double Payoff Calculation Printout

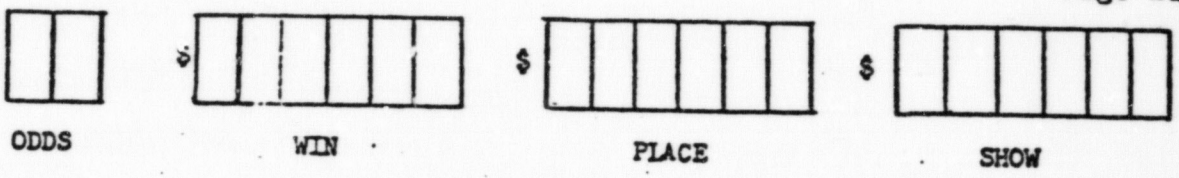


Figure B-1. Calculating Room Display - Regular Betting
Win Odds and Dollar Totals by Horse and by Pool

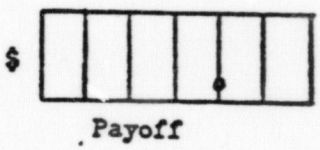


Figure B-2. Calculating Room Display - Daily Double
Payoff for First Race Winner with Each Second Race Horse

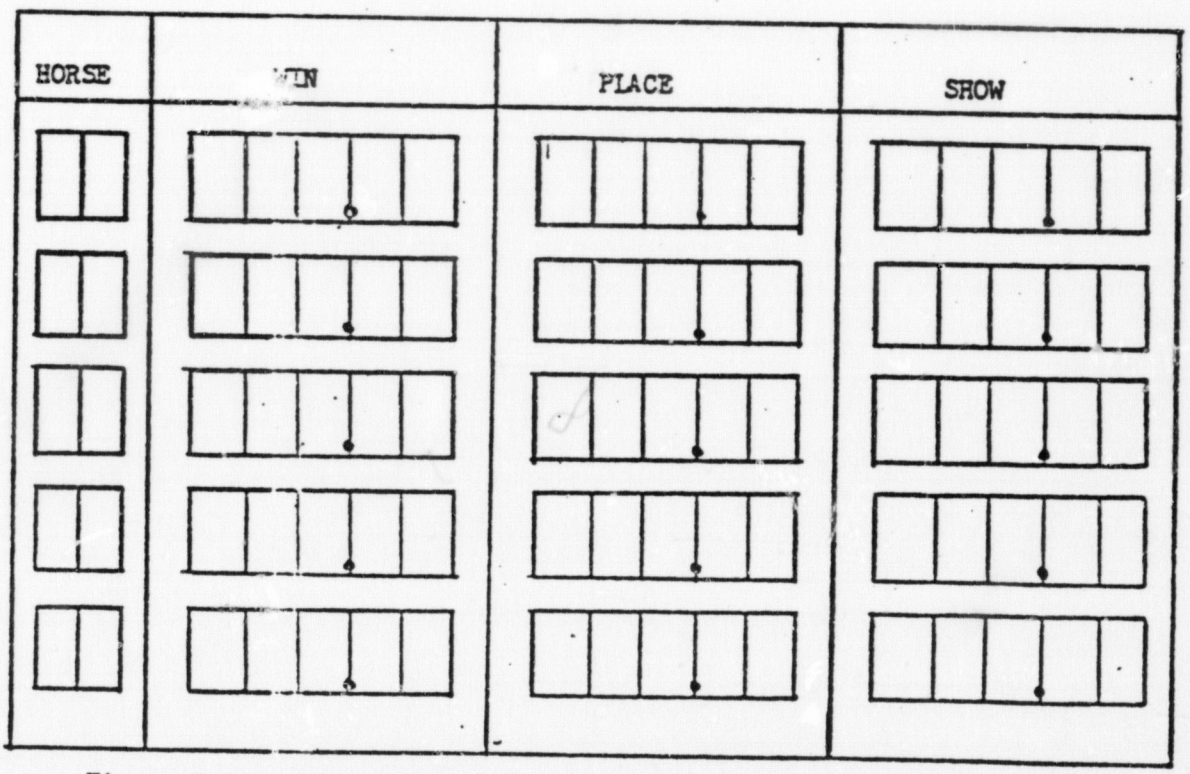


Figure B-3. Calculating Room Display - Regular Betting
Payoff in Dollars with Provision for Three Horse Dead Heat

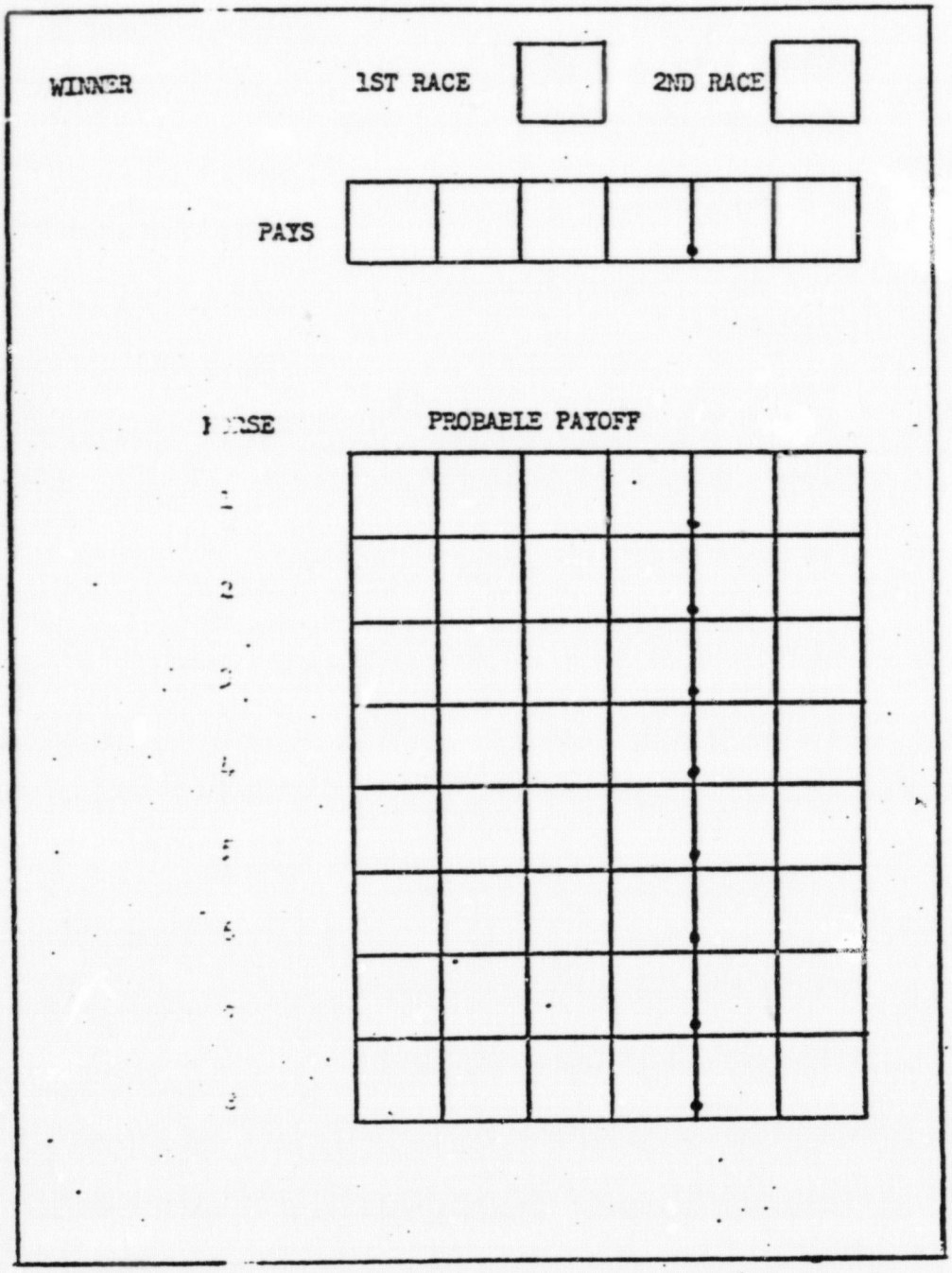


Figure B-4 Daily Double Winners and Payoff Display

HORSE		1	2	3	4	5	6	7	8	9	10
SHOW											
PLACE											
WIN											
ODDS											
HORSE		1	2	3	4	5	6	7	8	9	10

Note:- At each end of this infield display there is a Pay-off display as shown in Figure B-3.

Figure B-5 ...ular Betting Probable Odds and Dollar Totals by Horse and by Pool Infield Board Display.

APPENDIX C -- CALCULATIONS

$$\frac{\text{Net Win Pool}}{\text{Horse "X" Win Total}} - 1 = \text{Raw Odds}$$

Figure C-1. Raw Odds Calculation

$$\text{Total Win Pool} \times 0.85 = \text{Net Win Pool}$$

$$\frac{\text{Net Win Pool}}{\text{Win Horse Total}} \times \$ \text{ bet} = \text{Raw Payoff}$$

Figure C-2a. Raw Payoff for Single Win. All Regular Racing Raw Payoffs are Rounded Down to the Nearest $.05

$$\text{Net Win Pool} - (\text{Win Horse}^1 \text{ Total} + \text{Win Horse}^2 \text{ Total}) = \text{Net Distribution}$$

$$\left(\frac{\text{Net Distribution}}{2 \times \text{Win Horse}^1 \text{ Total}} 1\right) \times \$ \text{ bet} = \text{Raw Payoff for Horse}^1$$

Figure C-2b Win Dead Heat. A Similar Calculation is Performed for a Three Horse Dead Heat

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Total Place Pool x 0.85 = Net Place Pool . A943

Net Place Pool - (Win Horse for Place Total + Place Horse Total) ... et Distribution

$$\frac{\text{Net Distribution}}{2 \times \text{Win Horse for Place Total}} + 1 \times \$ \text{ bet} = \text{Plac Payoff on Win Horse}$$

$$\frac{\text{Net Distribution}}{2 \times \text{Place Horse Total}} + 1 \times \$ \text{ bet} = \text{Place Payoff n Place Horse}$$

Figure C-3 Raw Place Payoff for W & Place Horses

Total Show Pool x 0.85 = Net Show Pool

$$\text{Net Show Pool} - \left[\left\{\begin{matrix}\text{Win Horse}\\ \text{for}\\ \text{Show Total}\end{matrix}\right\} + \left\{\begin{matrix}\text{Place Horse}\\ \text{for}\\ \text{Show Total}\end{matrix}\right\} + \left\{\begin{matrix}\text{Sh Horse}\\ \text{T cal}\end{matrix}\right\}\right] = \text{Net Distribution}$$

$$\frac{\text{Net Distribution}}{3 \times \text{Win Horse for Show Total}} + 1 \times \$ \text{ bet} = \text{Show Pa off on Win Horse}$$

Figure C-4 Raw Show Payoff for Win Horse (a similar calculation is performe for the Place & Show Horses)

Total DD Pool x 0.85 = Net DD Pool

$$\frac{\text{Net DD Pool}}{\text{One Combination Total}} \times \$ \text{ bet} = \text{Raw Payoff (normal Daily Double)}$$

$$\left\{\begin{matrix}\text{Total}\\ \text{DD Pool}\end{matrix}\right\} - \left\{\begin{matrix}\text{Total Bet on 8 Combinations}\\ \text{with Scratched 2nd Race Horse}\end{matrix}\right\} \times 0.85 = \text{N DD Pool (consolation)}$$

$$\frac{\begin{matrix}\text{Total Bet on 8 Combinations}\\ \text{with Scratched 2nd Race Horse}\end{matrix}}{\begin{matrix}\text{Total Combination of 1st Race}\\ \text{Winner \& Scratched 2nd Race}\\ \text{Horse}\end{matrix}} \times \$ \text{ bet} = \text{Consolatio payoff}$$

Figure C-5 Daily Double and Consol ion Payoff

DEFENDANT'S EXHIBIT
B-L EV
NO. 67C1119

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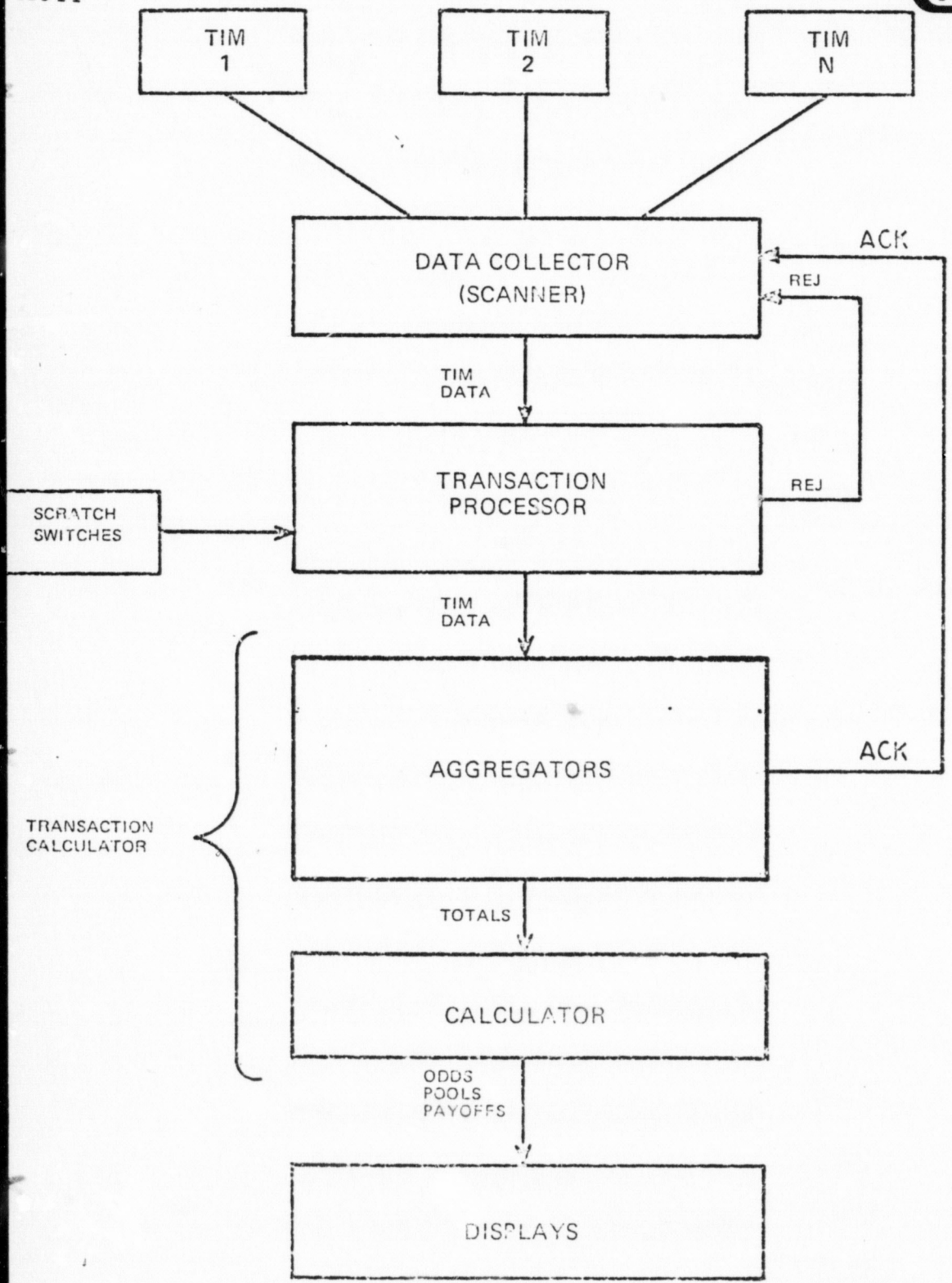

GENERAL

Functional
(all)

Aug. 23, 1949. J. HANDLEY 2,479,631

TOTALISATOR SYSTEM

Filed Sept. 7, 1944 7 Sheets-Sheet 1

DEFENDANT'S EXHIBIT
BQ
NO. 67C1119
PENCAD Systems, N.Y.

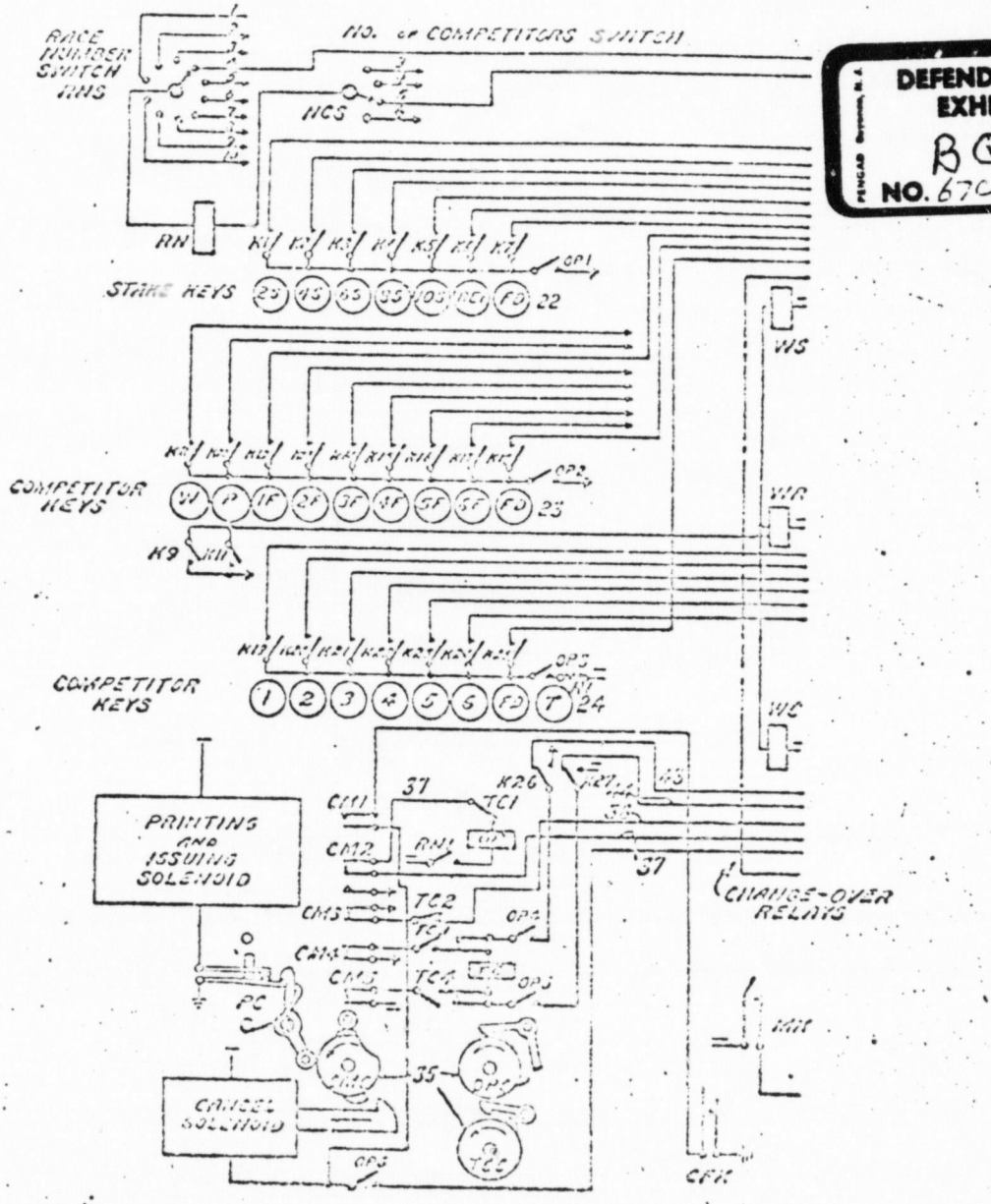

Fig. 1.

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A946

Aug. 23, 1949. J. HANDLEY 2,479,881

TOTALISATOR SYSTEM

Filed Sept. 7, 1944 7 Sheets-Sheet 2

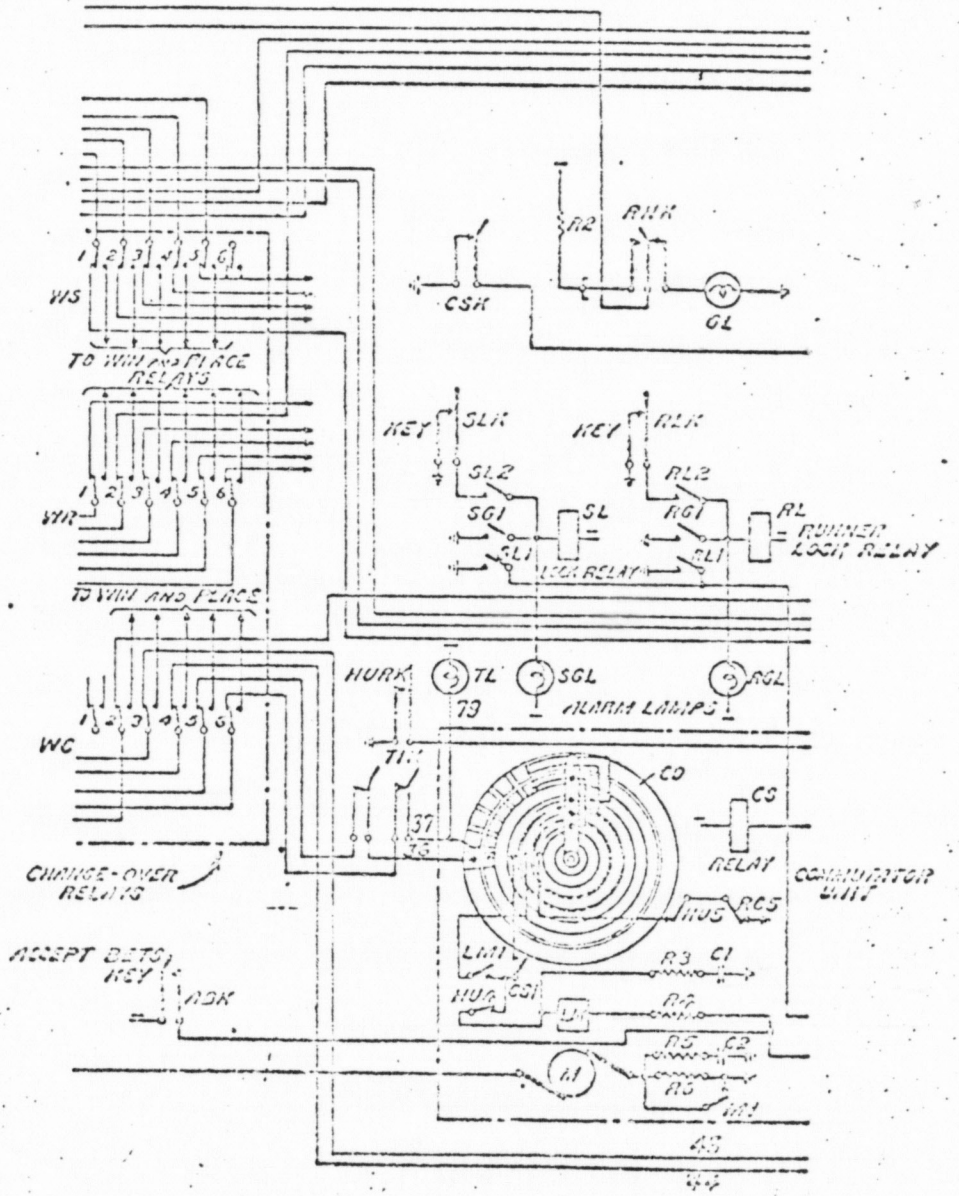

Fig. 2.

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Aug. 23, 1949. J. HANDLEY 2,479,681

TOTALISATOR-SYSTEM

Filed Sept. 7, 1944 7 Sheets-Sheet 6

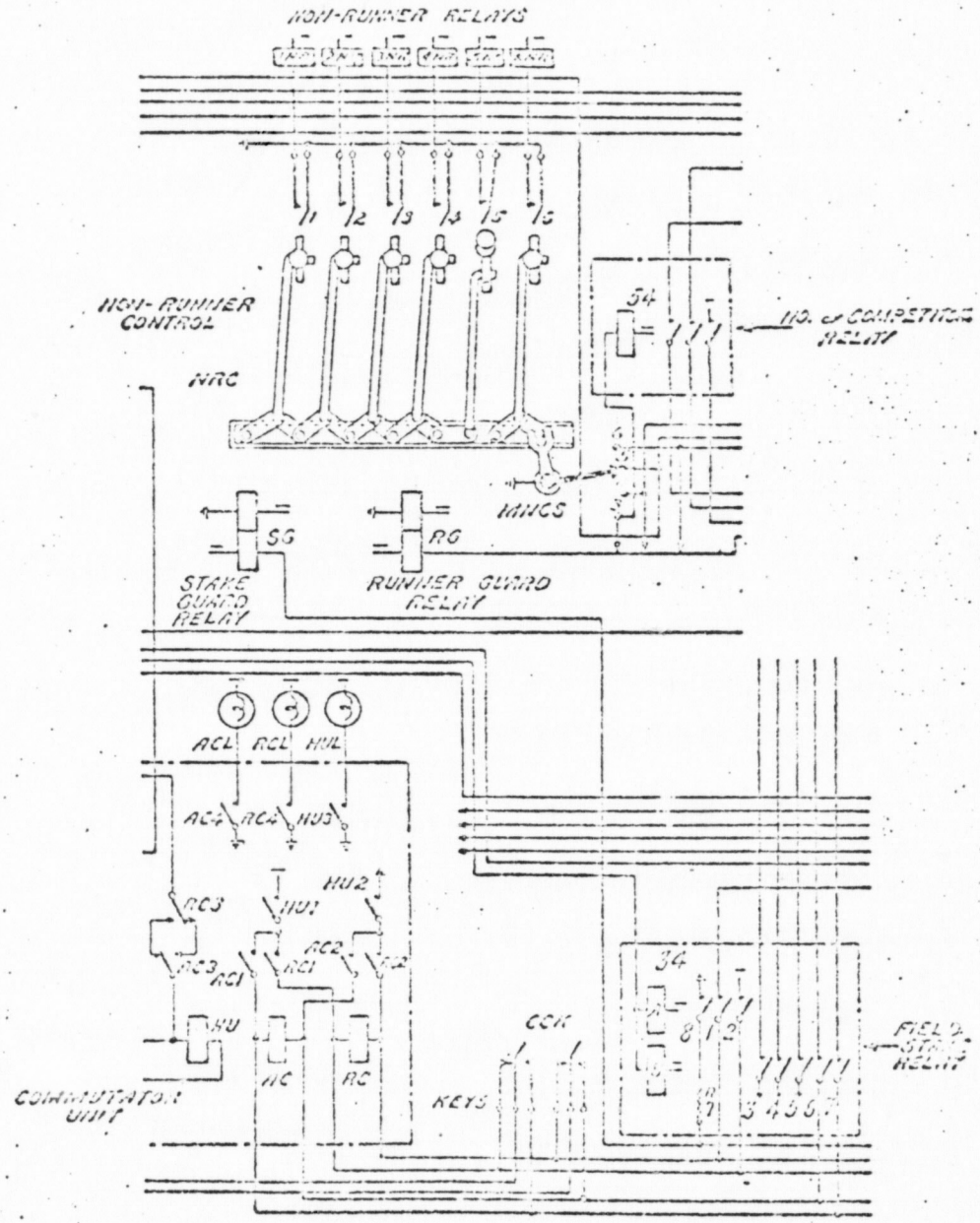

FIG. 3.

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Aug. 23, 1949. J. HANDLEY 2,479,031

TOTALISATOR SYSTEM

Filed Sept. 7, 1944 7 Sheets-Sheet 4

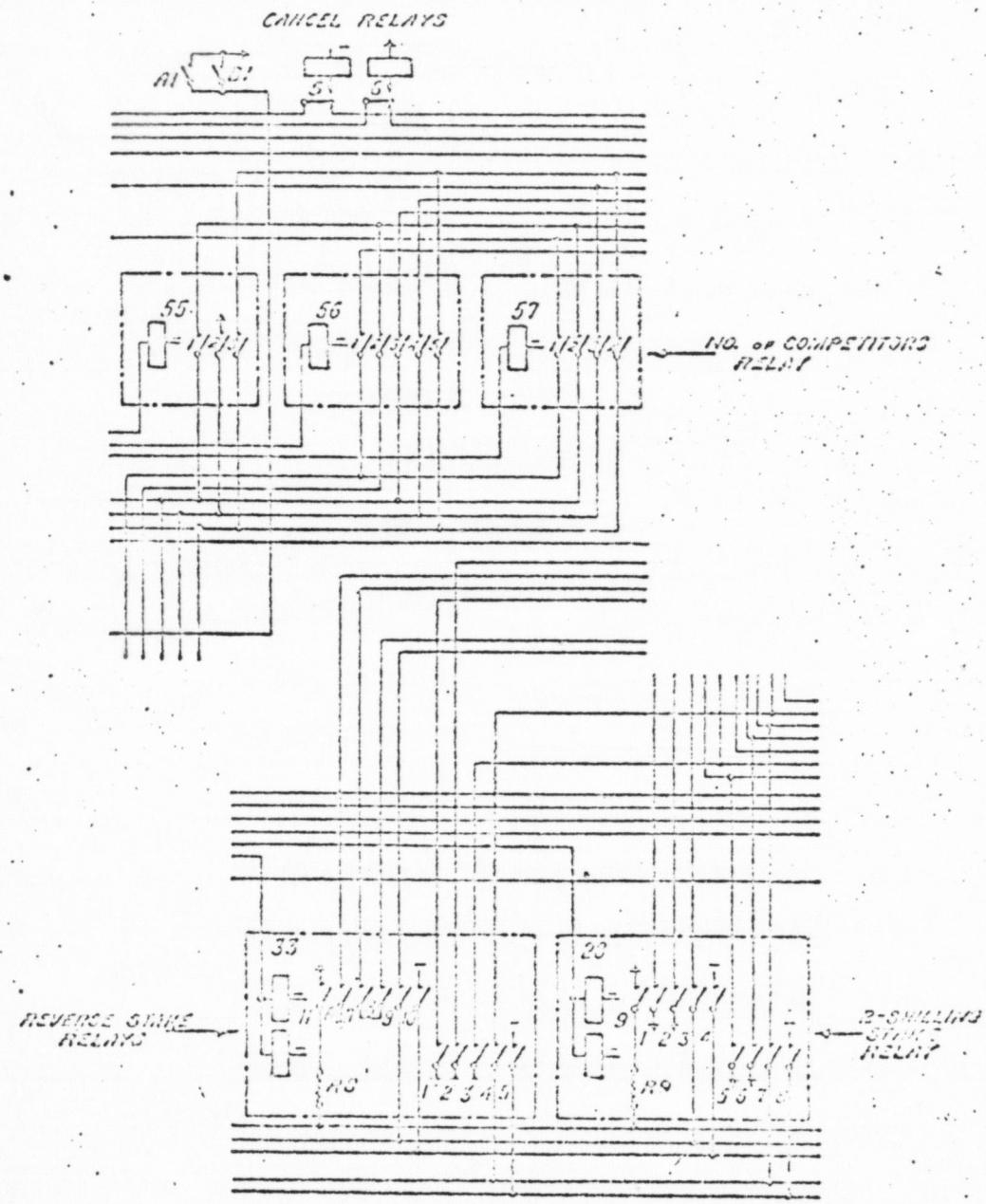

Fig. 4.

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A949

Aug. 23, 1949. J. HANDLEY 2,479,691

TOTALISATOR SYSTEM

Filed Sept. 7, 1944 7 Sheets-Sheet 5

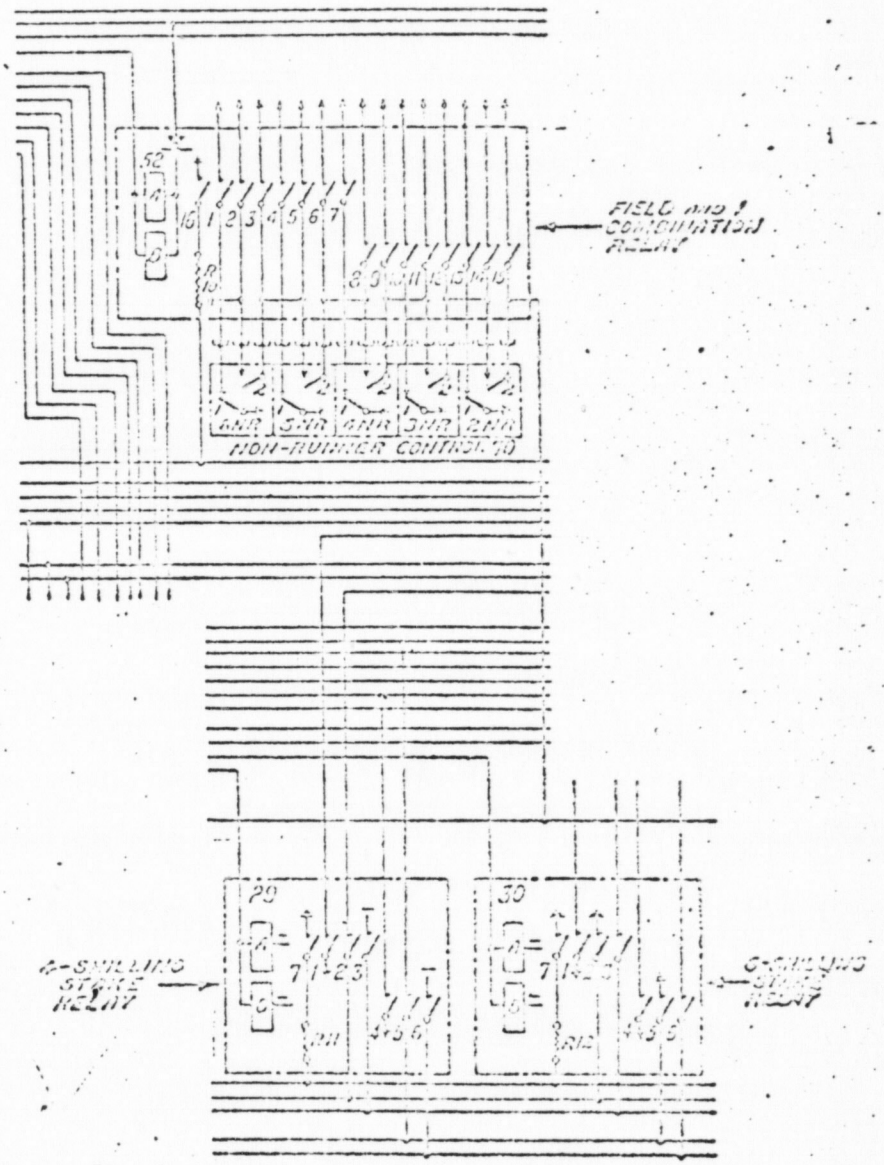

Fig. 5.

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Aug. 23, 1949. J. HANDLEY 2,479,631

TOTALISATOR SYSTEM

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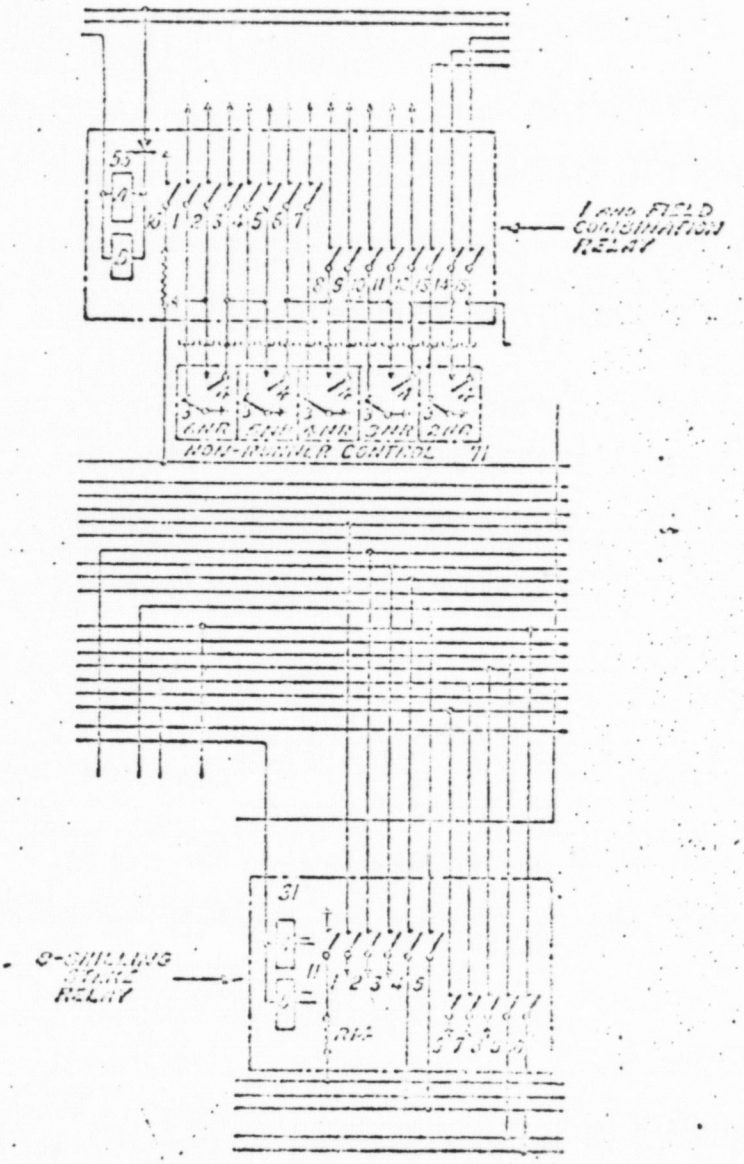

Fig. 6.

Aug. 23, 1949. J. HANDLEY 2,479,681

TOTALISATOR SYSTEM

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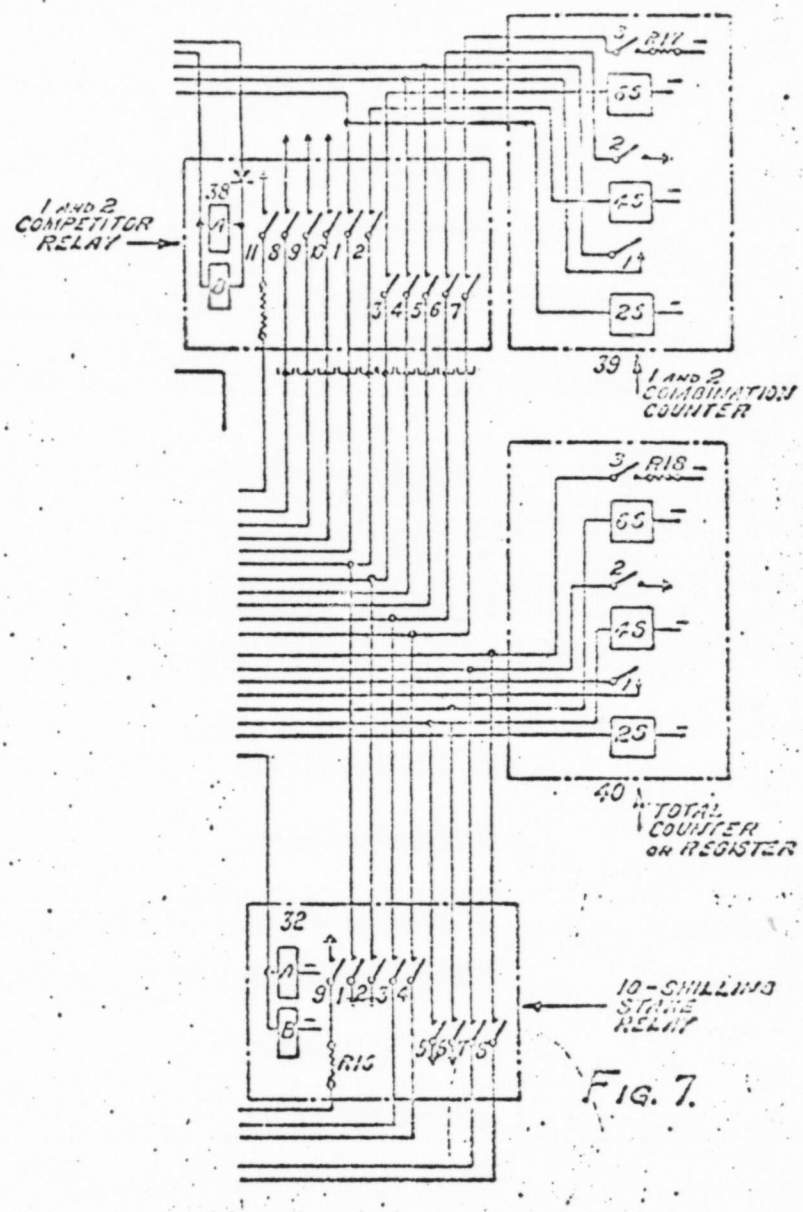

FIG. 7.

Patented Aug. 23, 1949

2,479,681

UNITED STATES PATENT OFFICE

TOTALISATOR SYSTEM

John Handley, London, England, assignor to The Union Totalisator Company Limited, Glasgow, Scotland, a British company

Application September 7, 1944, Serial No. 553,000
In Great Britain June 10, 1943

Section 1, Public Law 690, August 8, 1946
Patent expires June 10, 1963

10 Claims. (Cl. 235—92)

1

This invention relates to improvements in electric totalisator installations of the type in which bets originated at ticket issuing machines are transmitted to counting apparatus which indicates the value of the bets laid on the competitors and the grand total of the bets on all of the competitors.

An installation according to the invention includes ticket issuing machines which provide facilities for betting in multiple values on the Win, Place and Forecast, for betting on any two selected competitors for first and second place in both orders (this being known as reversed betting), and for betting on the "Field" for first or second place with any selected competitor for second or first place (this being known as field betting).

In Forecast betting the person making the bet has to forecast which two out of all competitors in a race will finish first and second respectively. With six competitors there are therefore thirty possible combinations. Field betting is a form of Forecast betting in which the betting is on all combinations involved by either selecting a competitor to win with each of the remainder of the competitors in turn to run second, or conversely by selecting a competitor to run second with each of the remainder of the competitors to in turn win.

The installation according to the invention consists of:

(1) Ticket-issuing machines.
(2) Change-over relays.
(3) Common Win and Place equipment.
(4) Common Forecast equipment.

It may be explained that, as there is at least as large a volume of betting on the Forecast as there is on the Win and on the Place combined, the Win and the Place pools are grouped as one equipment with its own cabling, commutators, relay sets and counters.

(1) A ticket-issuing machine comprises:
- (a) Sets of keys which, on being depressed, select:
  - (1) The Win and Place or the Forecast equipment.
  - (2) The competitor's number or numbers.
  - (3) The stake.
- (b) Type wheels which are set by the operation of the keys mentioned above, and prepared for the action of (c).
- (c) A printing and ticket-issuing solenoid.
- (d) Cash counters registering:
  - (1) The total number of units sold by the machine.
  - (2) The total number of "Win" units sold by the machine.
  - (3) The total number of "Place" units sold by the machine.
  - (4) The total number of "Forecast" units sold by the machine.

A unit is generally the highest common factor of the various stakes for which the machine is equipped to issue tickets, e. g., when the machine can issue 2, 4, 6, and 8 shilling tickets, the unit is 2 shillings.

2

(1) A ticket-issuing machine comprises:—Continued.
- (e) Relays and spring-operated contacts which are controlled by the common Win and Place or the Forecast equipment, and in turn control the operation of the printing and issuing device.

(2) The change-over relays comprise a set of relays controlled by the operation of certain of the keys of the ticket issuing machine, and which in turn control the connection of the machine to either the common Win and Place equipment or to the Forecast equipment.

(3) The common Win and Place equipment comprises:
- (a) A commutator unit, to the segments of which are connected wires leading via the change-over relays to individual ticket-issuing machines. Rotating brushes passing over these segments connect the ticket issuing machines in turn to registering units.
- (b) Counters which are the registering units. One Win counter is provided for each competitor and an additional unit, the Win Total counter, registers the sum of all bets recorded by the Win counters. Similarly, one Place counter is provided for each competitor, in addition to a Place Total counter.

  Each counter consists essentially of one or more electromagnets, the operation of which causes the rotation of discs on which numerals are displayed. The rotation of the discs also operates contacts controlling slave indicators. When more than one electromagnet is fitted in a counter, the rotation of the discs is effected through differential gearing. In this way simultaneous operation of two or more electromagnets still results in the registration of all operations of all magnets.
- (c) Relays, keys and lamps which are used to aid in the operation of the commutator unit and counter electromagnets, to check these operations, to isolate fault conditions and to indicate fault conditions.

(4) The Forecast equipment is similar to the common Win and Place equipment described above. The essential difference is that Win and Place counters are replaced by "Combination" counters, i. e., one counter unit is provided for every combination of any two competitors in each order, for example 1 and 2, 2 and 1, 3 and 4, 4 and 3. A "Total" Forecast counter registers the grand total of all combinations.

An electric totalisator installation according to the invention is illustrated diagrammatically in the accompanying drawings in which Figs. 1 to 7 are views intended, when placed side by side in a row, to form a continuous diagram.

Fig. 1 shows the circuit of the ticket issuing machine, which includes a number switch RNS, having conductors numbered 1 to 10, and which is set by the operator to the correct race number (shown as No. 4 in the diagram). Operation of switch RNS mechanically rotates a type wheel (preparing the printing of the correct race number on the ticket to be issued); this wheel and its operating gears are not shown on the diagram. The operator also sets a number-of-competitors switch NCS to the correct figure; (the diagram shows four contacts and conductors numbered 3, 4, 5 and 6, for 3, 4, 5, and 6 competitors, respectively, and the switch is shown set for five competitors).

A race number relay RN is connected in series with these two switches RNS and NCS. When

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the two switches are set correctly, a condition depending on master control keys in the common apparatus (Race number key RNK, see Fig. 2, and Non-runner control NRC, see Fig. 3), relay RN is operated and prepares a circuit for relay OP (see Fig. 1). It will be seen later that relay OP controls the operation of the machine, and, therefore, unless the correct settings are made on switches RNS and NCS, no tickets can be issued by the machine.

Each ticket issuing machine has three rows of keys 22, 23, and 24. Below the race number relay RN is shown a row 22 of seven keys (numbered in this diagram 2S, 4S, 6S, 8S, 10S, REV and FD), with their contacts K1, K2, K3, K4, K5, K6, and K7, respectively. These, the front row of keys on the machine, are the stake keys, and the keys 2S to 10S are the 2 to 10 shilling keys. Depression of any one stake key closes its contact, preparing a circuit for the operation of the associated stake relays 32 to 34 shown in Figs. 3 to 7.

At the same time depression of a stake key rotates a type wheel, preparing to print the value of the stake on the ticket to be issued. Also operation of the stake key engages and controls mechanically gearing to actuate counters for registering the cash transaction. The amount of travel which is to be imparted to the cash counters varies with the key depressed; i. e., the 4 shilling key 4S imparts double the travel of the 2 shilling key 2S and so on. The key marked REV is for "Reverse Bets," a double transaction, and this key imparts double the travel of the 2S key. The key marked "FD" is for "Field Bets," a variable quantity depending on the number of competitors, and the travel imparted to the cash counter by this key is therefore adjusted by a mechanical interlock with the number of competitors switch NCS mentioned above. (None of the mechanical gears, interlocks and type wheels referred to in the present paragraph is shown in the circuit diagram.)

Under the stake keys is shown a row 23 of 9 keys marked W, P, 1&, 2&, 3&, 4&, 5& and 6& and FD, together with their contacts K8, K9, K10, K11, K12, K13, K14, K15, K16, K17 and K18. These are competitors keys; W and P are "Win" and "Place" keys, respectively; the remainder are keys associated with the first choice of a Forecast pair, key 1& representing No. 1 competitor to be first of the pair, key 2& representing No. 2 competitor to be first of the pair and so on. The key FD representing "the Field" to be first of the pair; i. e., a single competitor is chosen to be second of the pair and all other competitors covered as first choices: a group of $x-1$ transactions where x is the total number of competitors.

The W and P keys close contacts K8 and K10, respectively, preparing circuits for the operation of "Win" or "Place" relays in the common equipment. The same keys also close contacts K9, and K11 either of which closes a circuit to operate the changeover relays WS, WR and WC (see Fig. 1). The other keys on this row close contacts preparing circuits for the operation of the associated "combination" relays, of which three are shown in dot and dash rectangles in Figs. 5, 6, and 7, in the diagram as typical examples. These are relay 52 with A and B magnets for combination "Field &1," relay 53 having A and B magnets for combination "1 and Field," and relay 33 having magnets A and B for combination "1 & 2" competitors.

At the same time, depression of any key in this row (1) rotates type wheels preparing for printing of the relevant information on the ticket to be issued, and (2) engages the appropriate cash counter (Win for the "Win" key, Place for the "Place" key and Forecast for any of the other keys in the row, the "total" cash counter being in constant engagement.)

The lowest row 24 of keys consists of eight keys marked 1, 2, 3, 4, 5, 6, FD and T, respectively, and the first seven named have associated contacts K19 to K25, respectively. The first seven named keys from left to right are competitor keys and the six numbered 1 to 6 represent either "Win" or "Place" competitors or second choice competitors in a Forecast combination according as the "Win," "Place" or first choice competitor key has been operated in the row 23 above. The FD key represents the Field as a second choice in a Forecast combination. T is a test key which operates contact OP3. Operation of any one of the first six keys closes its associated contact and either (1) prepares a circuit for the selected "Win" or "Place" relay in the common equipment, or (2) completes the preparation of a circuit for a Forecast combination relay such as 52, 53 and 33. The key FD closes its contact, completing the preparation of a circuit for Forecast combination relays having the Field as second choice, for example relay 53. All keys in this row, by means of gearing not shown, rotate type wheels preparing for printing of the relevant information. The test key T is associated with two contacts K26, and K27 directly therebelow. When the test key is depressed, mechanical interlocks, not shown, (1) cause any other key that may have been operated to be released, (2) prevent the operation of any cash counter and (3) rotate a type wheel to prepare for the printing of a ticket marked Test. The closure of contacts K26 and K27 prepares a local circuit for the operation of the machine to issue this ticket.

When a complete set-up of keys has been operated, for a bet, a mechanism (not shown) is actuated to release a rotating contactor unit 35 shown diagrammatically in Fig. 1 beneath the lowermost row of keys. This contactor unit, which is spring-driven, consists essentially of (1) an operating cam OPC having two escapement teeth with its magnet OP and contacts OP1 to OP5, (2) a check cam TCC with its magnet TC and contacts TC1 to TC4, and (3) a control cam CMC with its contacts CM1 to CM5.

Set up of the stake and competitor keys releases the unit so that it is in the "ready" position. In this condition, when the continuously rotating brushes of the commutator CO of the commutator unit previously mentioned as part of the common equipment (see dot and dash rectangle in Fig. 2), reach the segments allotted to the ticket issuing machine under consideration, a circuit is completed from the control magnet contact CM3 through the normally made contact TC2, through a lead 36 and [illegible] rotating brushes of the commutator unit to a latching magnet LM of the latter, the operation of which lowers the speed of rotation of the brushes. At the same time a circuit is completed for the magnet OP (Fig. 1) from contact RN1 operated, contact TC1 normal, contact CM2, and lead 37 through the commutator brushes, and OP then operates.

Operation of OP closes its contacts OP1 to OP5. Contacts OP1 to OP3 in closing complete circuits through the "stake" and "competitor"

key contacts to the selected "stake" and "competitor" relays 23 to 34 and 33. Contacts OP4 and OP5 in closing prepare for a checking circuit back from the common equipment to operate the magnet TC. The contact OP5 in closing prepares a circuit for a "cancel solenoid" hereinafter referred to. At the same time, the armature of the OP magnet (which forms an escapement on the contactor rotor OPC) in operating, allows the rotor to move round to a second position where it is retained by the vertical arm of the escapement of the rotor OPC. When the checking circuit is completed in the counters, the magnet TC will operate and will open contacts TC1 and TC2, and make-before-break contacts TC3, and TC4 will close a holding circuit for the TC magnet over the made contacts CM4 and CM5 of the control cam CMC, while opening the operating circuit of magnet TC through contacts OP4 and OP5. The opening of contact TC1 breaks the circuit for the OP magnet and this will release, breaking the circuit closed by its contacts OP1 to OP5.

At the same time, the release of the OP magnet releases the escapement rocker for the rotor OPC and allows the contactor rotor OPC with its cams TCC and CMC to revolve. The teeth of the rotor cam OPC and the arm of its escapement rocker are not in the same plane. The opening of the contact TC2 will break the circuit to the latching magnet LM of the commutator unit; LM will restore, and release the commutator brushes which will now rotate at high speed until slowed down again when the next "set-up" issuing machine is found. Operation of the armature of the magnet TC lifts a catch engageable with a tooth on TCC, allowing the contactor rotor to complete its cycle of rotation and the control cam operates a "printing" contact PC, which in turn closes a circuit for the "printing and issuing solenoid." This solenoid prints and issues the ticket, actuates the selected cash counter, and pre-sets the rotating contactor unit 35 in readiness to receive another bet. During the rotation of the contactor unit (before operation of the printing solenoid) the cam CMC (1) opens its contacts CM4 and CM5, restoring the TC magnet to normal, (2) closes its contact CM1, preparing a "cancel" circuit to the "cancel solenoid," and (3) changes over the contact CM2, breaking and earthing the control lead to the commutator unit in the common equipment.

Some other apparatus (not part of the ticket issuing machine) is shown in Fig. 1.

The key CFK, cancel fault key, mounted in the common apparatus, is used to operate the cancel solenoid and restore the contactor unit to a position of readiness after the machine has been held in a fault condition.

The magnets of the change-over relays WS, WR and WC are shown in Fig. 1 and in graphical relationship with these magnets, but in Fig. 2, in a dot and dash rectangle are shown the associated contacts numbered 1 to 6 for each relay. The windings of all the change-over relays, connected in parallel, are energised by the operation of either the "Win" or the "Place" key. Leads from the "stake" keys in the ticket issuing machine are taken to the contacts of WS relay. When this relay is not operated, connections through its contacts are made to the forecast stake relays 23, 33, etc., in the common equipment (see Figs. 4 to 7). The illustrative lead from contact No. 1 is to relay 33. When the relay WS is operated, these connections are transferred by its contacts by downwardly pointed leads to similar "Win" and "Place" stake relays (not shown in the diagram). Similarly, the relay WR routes connections from the lower row of keys (see Fig. 1) either to forecast combination relays, e. g., 32 magnets A and B, by the illustrative lead from contact No. 2 (see Fig. 5), or to "Win" and "Place" competitor relays, (not shown in the diagram) by upwardly pointed leads. Again, the relay WC routes "control" leads from the contactor unit in the ticket issuing machine to the commutator unit (see Figs. 2 and 3) of the "Forecast" equipment or to the commutator unit of the "Win" and "Place" common equipment.

The key CSK of Fig. 2 is the "close sales" key and is thrown when ticket machine operators are ordered to cease selling. Throwing CSK breaks the circuit of a relay CS in the commutator unit (see Fig. 2), and the relay CS in releasing opens the contact CS1 (see Fig. 2); which breaks the circuit from the commutator unit latching magnet LM to the ticket issuing machine. When LM is not operating the rotating brushes of the commutator CO will not be slowed down to pick up bets from any set-up machine.

The race number key, RNK in Fig. 2, of which there is one for each race, is the common control associated with the race number switches RNS in the ticket issuing machines. When thrown, RNK provides a circuit through the common resistance R2 to operate the race number relay RN in the ticket issuing machines by NCS and MNCS. A guard lamp GL and coil lead provides an immediate indication of a short-circuit between race number connections.

SL in Fig. 2 is a stake guard lock relay. In Fig. 3 is shown a stake guard relay SG, which operates momentarily if two or more pairs of "stake" relays, e. g., 34 and 33 operate simultaneously (through some fault such as a short circuit between stake connections). Relay SG in operating closes the contact SG1 (Fig. 2) and the relay SL operates and locks over its own contact SL2 to earth through the stake guard release key SLK. The contact SL2 also completes a circuit for the alarm lamp SGL. The contact SL1 earths a lead to a hold-up relay HU in the commutator unit (see Fig. 3), and this relay prevents bets being accepted by the commutator unit as will be described later.

The key SLK releases the relay SL. A similar arrangement consisting of a runner guard lock relay RL, a runner guard relay RG (in Fig. 3) and the runner guard release key RLK, with alarm lamp RGL, is included to deal with faults on "competitor" connections.

Below is a hold-up relay release key HURK which is used to release the hold-up relay when it has been locked up on a fault condition.

A key such as TIK in Fig. 2 is inserted in the control connections to each ticket issuing machine, and can be used to break these connections. This is the ticket machine isolating key. Associated therewith is a lamp TL which is lit when the check magnet TC in a machine fails to operate, because the roller tracking CMC drops into the recess and allows the needle contact of switch CM3 to drop onto the bottom contact.

In a small chain-dotted rectangle, partly in Fig. 2 and partly in Fig. 3 is shown the commutator unit. This consists of a rotor unit carrying brushes wiping on two concentric rings of segments and driven by a motor M. The unit includes four relays CS, HU, AC and RC, resistances and condensers.

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The motor M is started by a motor key MK shown in Fig. 1 and its speed is controlled by a centrifugal governor shown diagrammatically as MI associated with resistances R5 and R6 and the condenser C2. The motor drives the shaft carrying the brushes through gearing and a slipping clutch not shown. The normal speed of the shaft is reduced by the operation of the latching magnet LM which by means of mechanical interlocks (not shown) engages the gearing necessary for this reduction in speed.

The brushes on the rotor are six in number connected electrically to form three pairs. Of each pair one (the "slip ring" brush) makes contact with a slip ring while the other (the "segment" brush) wipes over one of the two rings of segments. Two "segment" brushes make contact with the outer ring of segments, the outer brush being set slightly in advance of the inner. The third "segment" brush makes contact with the inner ring of segments. The connections pairing "segment" and "slip ring" brushes are shown in the diagram.

The relay CS has one contact CS1; the relays HU, RC and AC have each five sets of contacts numbered 1 to 5. The latching magnet LM has one contact LM1. Associated with the relays HU, RC and AC and with LM is the accept bets key ABK, which, when thrown, provides a battery circuit.

The latching magnet LM is energised when the outer "segment" brush reaches a segment connected to a ticket issuing machine which is "set up" (earth being placed on this connection by the set-up condition). As LM operates, contact LM1 closes and brings the second or lagging "segment" brush into parallel with the leading brush. At the same time LM brings into action the slow gearing of the commutator brushes.

The inner "segment" brush, making contact with the segment in the inner ring associated with the same ticket issuing machine, completes a circuit through normally made contacts HU5 and RC5 (Fig. 2) for the operation of the OP magnet in the ticket issuing machine.

RC and AC are a "competitor" or "combination" check relay and a "total" check relay, respectively. They are operated by battery and earth supplied by the "stake" relays 33 to 36 through contacts on the "competitor" or "combination" and "total" counters, respectively, thus providing a check on the operation of these counters. Normally, the relays AC and RC will pulse under the control of successive contact operations in the counters, and will have no effect on the functioning of the installation. If, however, through some fault condition either the total counter or the competitor counter fails to operate and register the transaction, then either relay AC or RC will not receive an energising pulse. Let it be supposed that the total counter operates and that the competitor (or combination) counter fails. Relay AC operates but relay RC does not.

A circuit is made to operate the relay HU (Fig. 3) from the hold-up release key HURK through contact RC3 normal, contact AC3 operated, HU winding and the "accept bets" key ABK operated. Relay HU operates and closes a locking circuit for relay AC from contact HU2 operated, AC2 operated, AC winding, contact AC1 operated and contact HU1 operated. Relay AC locks up and the contact AC4 lights steadily the lamp ACL for relay AC. At the same time contacts HU3 and HU4 break the control connections to

the commutator segment rings, and thence to any of the ticket issuing machines. Contact HU3 closes a contact to light the hold-up lamp HUL. Thus, briefly, the fault has caused all betting to stop (indicated by lamp HUL lit). The fact that lamp ACL is lit and lamp RCL is out shows that the last bet has failed to be registered on the "competitor" or "combination" counter. Release of the hold-up after any necessary examination and adjustment, is effected by a momentary opening of the key HURK. The circuit conditions if relay RC operates and relay AC fails are similar.

Referring to Fig. 3, at the top of the diagram is shown the non-runner control NRC. This consists essentially of six keys, 1 to 6, with six relays 1NR to 6NR and a "master" number of competitors switch MNCS. Briefly, the function of this apparatus is (1) to prevent the registering of a bet and the issue of a ticket on a non-runner and (2) to prepare the connections for adjusting the number of combination counters operated and the number of transactions registered on the total counter when a "field" bet is set up.

When one or more of the keys 1 to 6 is operated, it closes a circuit for the operation of the associated non-runner relay or relays 1NR to 6NR. At the same time the mechanical interlock shown diagrammatically causes the switch MNCS to move from its normal position on the contact 6 to contact 5, 4 or 3 according to the number of keys depressed. (Fig. 3 shows No. 5 competitor as a "non-runner" and a total of five competitors in the race.) The switch MNCS closes a circuit for one of four "number of competitors" relays 54, 55, 56 and 57 (shown in Figs. 3 and 4), and also completes a circuit to the "number of competitors" switch NCS in the ticket issuing machines (as previously described). The selected "number of competitors" relay (shown as 56) operates and closes contacts preparing selected connections between the field stake relays 34, A and B (see Fig. 3) and the "total counter" 40 in the dot and dash rectangle in Fig. 7.

In the example shown connections are made for the 2 and 6 shilling magnets 2S and 6S of the "total" counter registering a bet of 8 shillings or four 2 shilling units, there being four transactions in any field combination; e. g. 1& means 1 & 2, 1 & 3, 1 & 4 and 1 & 6, (No. 5 being a non-runner).

When a key of NRC is depressed, the associated non-runner relay 1NR to 6NR in Fig. 3 is operated. Its contacts 1, 2, 3 and 4 of "Non-Runner controls" 70 and 71 breaks feed and loops to the affected counters via the "Field" combination relays 52 and 53. (See Fig. 5 and Fig. 6.) For example, referring to Fig. 6 and supposing No. 2 to be a non-runner, contact 3 of 2NR in control 71 is normally made and supplies earth via contact 13 on the relay 53, B to the 2 shilling magnet 2S on 1 & 2 combination counter 39 (see Fig. 7). When contact 3 of 2NR is broken, this feed is removed and the 2 shilling magnet on the counter cannot operate. Further, to prevent any possibility of a check back from this counter, the loop contact 1 on the 1 & 2 combination counter 39 which normally makes on each operation of the 2 shilling magnet is short-circuited by contact 4 of 2NR in control 71. Similarly, contacts 1 and 2 of 2NR in control 70 of Fig. 5 will perform the same functions on the 2 & 1 combination counter (not shown) through

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contacts 13, 14 and 15 of the field combination relay 52, B shown in Fig. 5.

Non-runner contacts 5 and 6 of the "cancel relays," Fig. 4 break the first and second competitor leads such as those from the contacts K12 and K20 of the ticket issuing machines to the combination counters, and connect these leads to the cancel relays A and B. If either 1NR or 2NR relays in the example shown, operates, relay A or B is energised, and the closing of contacts A1 or B1 sends an earth back to the ticket issuing machine from which the fault originated to operate the "cancel solenoid" via contact OP6 (see Fig. 1). The cancel solenoid in the machine resets the contactor unit 35 in the machine concerned to its original position, and releases the keys set up.

At the bottom of Fig. 3 is a key CCK—the check change-over key. It has previously been described how the relays AC and RC in the commutator unit are operated by feeds sent back from the counters. It has also been described how the same check feeds operate the TC magnet in the ticket issuing machine. These feeds pass through the CCK key and normally the feed to RC is transmitted via the key to the ticket issuing machine through leads 43 and 44. If CCK is operated, connections are made to feed the AC check instead of the RC check back to the machine.

To the right of CCK are the "stake" relays, 34 A & B in Fig. 3; 33 A & B and 28 A & B in Fig. 4; 29, A & B and 30, A & B in Fig. 5; 31, A & B in Fig. 6 and 32 A & B in Fig. 7. These pairs of relays are for Field, Reverse, 2, 4, 6, 8 and 10 shilling stakes, respectively, and are operated by depression of the associated "stake" keys in the ticket issuing machines. Note for example that the circuit for the 10S key is shown complete, and passes through the WS relay to the 10 shilling relay 32. These stake relays select circuits to operate only those electro-magnets in the counters, such as 39 and 40, which will register the value of the bet, e. g., the 2 shilling relay 28 operates magnet 2S; relay 29 the magnet 4S; relay 30 magnet 6S; relay 31 magnets 2S and 6S; relay 32 magnets 4S and 6S. The stake relays also close contacts to transmit back to the commutator unit and ticket issuing machine the check conditions originated by the counter when the latter operates.

To give a typical example, consider the 2 shilling stake relays 28, A and B in Fig. 4. When the 2 shilling stake relay key 2S in the row 22 of the ticket issuing machine is depressed, relays A and B of 28 operate and close their contacts numbered 1 to 9. Contact 1 closes an earthed circuit commoned over all combination relays. In the example let us suppose that combination 1 and 2 has been selected, then combination relay 38 (see Fig. 7) is operated. The circuit from contact 1 on the relay 28 is routed through contact 1 on the 1 & 2 combination relay 38, and the 2 shilling electro-magnet 2S on the 1 & 2 combination counter 39 (see Fig. 7) to battery. The electro-magnet 2S operates.

Contact 2 on the 2 shilling stake relay 28 closes an earth circuit through contact 4 on the 1 & 2 combination relay 38, through contact 1 on the 1 & 2 combination counter 39 (which is closed by the operation of the electro-magnet 2S) back through contact 5 on the 1 & 2 combination relay 38, through contact 3 on the 2 shilling stake relay 28, through RC relay in the commutator unit (see Fig. 3), back through contact 4 on the relay 28 to battery. This operates relay RC and a parallel circuit is tapped off from the key CCK to operate the TC magnet in the ticket issuing machine (see Fig. 1).

Contact 9 on the relay 28 closes an earthed circuit through the 2 shilling electro-magnet 2S on the total counter 40 (see Fig. 7) to battery. This electro-magnet operates and closes its contact 1.

Contact 8 on the relay 28 closes an earthed contact, through contact 1 on the total counter 40 back through contact 7 on the stake relay 28, through relay AC in the commutator unit, back through contact 3 on the stake relay 28 to battery. This operates the total check relay AC.

Thus, contacts 1 to 8 have provided circuits to (a) operate the correct electro-magnets in the combination and total counters 39 and 40 for the registration and indication of the bet, and (b) route the "operation checking" circuits from the combination and total counters to the checking relays RC and AC in the commutator unit and to the checking magnet TC in the ticket issuing machine.

Contact 5 on the stake relay 28 provides a guard against the simultaneous operation of two or more stake relays. This guard operates as follows: Contact 9 on the 2 shilling stake relay 28 earths through a resistance R9 a lead common to all other stake relays, and connected through one winding of guard relay SG to battery. Relay SG is so designed that it will not operate in series with resistance R9. Should, however, another stake relay be operated, then a second earth is connected to the common lead through a second resistance R8, R7 etc., similar to R9. Relay SG, being now connected in series with two or more resistances in parallel, will operate on the increased current, and in turn to close its contact SG1 and operate relay SL (Fig. 2). This second relay locks itself over a key SLK as previously described, stops betting, and gives an alarm.

The connections for the field stake relay are shown primarily in Figs. 3 to 7 except of course that this relay 34 is shown connected to the field key, the last of the stake keys 22 in Fig. 1. When the relay 34, A & B and the number of competitors five-runner relay 56 are operated contact 3 of relay 34 provides a grounded circuit through contact one of relay 56 to operate the two shilling magnet 2S of the total counter 40. Contact 4 of relay 34 provides a grounded circuit via contact 2 of relay 56 to operate the 6 shilling magnet 6S of the total counter 40. Contact 5 of the field stake relay 34 also provides a grounded circuit via contact 3 of relay 56 through contact 1 of magnet 2S of the total counter 40 and back via contact 4 of relay 56 and contact 6 of relay 34 through relay AC and back via contact 7 of relay 34, contact 5 of relay 56 and contact 3 of the 6 shilling magnet of counter 40, by which the circuit is connected to battery through resistance R10. This circuit records an 8 shilling bet on the total counter 40 and checks its operation by way of the relay AC. Certain of these functions are essentially the same as those described above in connection with the circuits connected through the 2 shilling stake relay 28.

In Figs. 5, 6 and 7, above the stake relays are shown the competitor or combination relays 52, A & B, 53, A & B and 54, A & B. These are typical. One such relay (or pair of relays) is fitted for each competitor (Win and Place) and for each combination (Forecast).

These relays are energised by the depression of the competitor keys in the ticket issuing ma-

chine, and close circuits to operate all three electro-magnets in the associated counters and to transfer check circuits from these magnets. The stake relays, as has been previously described, select only those magnets (and therefore checks) necessary to register the amount of the transaction.

A guard contact with resistance (R10, R13, R15), similar to that already described in connection with the stake relays, operates in conjunction with the competitor guard relay, RG (see Fig. 3) to give an alarm when two or more competitor or combination relays are operated simultaneously.

To the right in Fig. 7 are shown diagrammatically the circuit arrangements of two typical counters, the 1 & 2 combination counter 39 and a total (Forecast) counter 40. Electrically, each counter consists of three magnets 2S, 4S and 6S with three sets of check contacts (closing on the operation of the associated magnet) 1, 2 and 3, respectively. Contact 1 closes a loop, through contacts on the competitor or combination relay, back to the stake relay, for energisation of the check relays AC and RC and check magnet TC in the ticket issuing machine as has been previously described. Contact 2 carries a connection, and contact 3 places battery (through a resistance, e. g., R17 or R18) on a connection, through the competitor and stake relays, for the same purpose.

The circuits between the various relays are readily traced by following the conductors shown in the drawings. Some conductors are not shown completely as indicated by arrow points. However, the paths of various groups of conductors such as from the ticket issuing machine and relays WS, WR, WC, etc., are indicated by an example.

It is to be understood that while the bet unit is referred to in shillings it may be in dollars or other currency.

What is claimed is:

1. An electric totalisator installation including a ticket issuing machine providing facilities for registering the amounts of bets made on competitors in the classes of Win, Place and Forecast, on any two selected competitors for first and second place in both orders, and on the Field for first or second place with any selected competitor for second or first place, a plurality of counters for separately registering the amounts for each of the different classes and combinations of bets, a total counter for registering the total value of all bets, said ticket issuing machine including key-operated contact means for selecting the amount of the stake of each bet, a key-operated contact means for selecting the class of bet and the competitor or competitors, a rotary contactor unit operable upon operation of a set of keys for a given bet, said unit including means for closing circuits through the contacts of the operated keys, a commutator unit, means for driving the commutator unit, circuit means including a control relay for connecting the commutator unit with the circuit closing means of the rotary contactor unit, and an electrical circuit means associated with the key-operated means for transmitting electrical impulses from the key-operated contacts of the ticket issuing machine to a selected separate counter for the class of bet made and to the total counter, each counter including electrically-operated means connected into the circuit means for registering the amount of a bet on the selected counter and on the total counter.

2. An electric totalisator installation as defined by claim 1 in which the electrical circuit includes a change-over relay for selecting the counter for a particular class of bet, and means on the ticket issuing machine for energizing said relay.

3. An electric totalisator installation as defined by claim 1 in which the electrical circuit includes a set of change-over relays normally biasing the circuit away from the registration of bets on the Win and Place counters, and in which said key-operated means includes keys for shifting said relays for the registration of bets on the Win and Place counters.

4. An apparatus as defined by claim 1 in which the said electrical circuit means includes a stake relay for the amount of each stake selectable by the key-operated contact means of the ticket-issuing machine for the corresponding stake amount, and in which said key-operated contact means includes a key for each amount, actuating means for each stake relay, and impulse transmitting-means from the respective keys for transmitting an impulse through the actuating means of the respective stake relays.

5. An electric totalisator installation as defined by claim 4 in which the stake relays are electrically connected to the total counter, and means for electrically connecting said stake relays to a selected class-of-bet counter by actuation of the corresponding class key in the ticket-issuing machine.

6. An electric totalisator installation as defined by claim 5 in which the means for electrically connecting the stake relays to the selected class-of-bet counter includes a competitor relay, and a conductor from a competitor key in the ticket-issuing machine for activating the competitor relay.

7. An electric totalisator installation for registering the amount of stake bets including a ticket-issuing machine provided with means for selecting the amount of the stake, means for selecting a competitor or combination of competitors on which a bet is placed, a plurality of competitor counters for separately registering the amounts of the bets on the different competitors or combinations of competitors, a total counter for registering the total of the amounts bet, a separate stake relay for each stake amount selectable by the amount-selecting means of the ticket-issuing machine, each relay being directly connected in circuit with its respective stake amount-selecting means in the ticket-issuing machine and operated solely in response to an electric impulse transmitted thereto by actuation of the respective stake amount-selecting means, and an electrical circuit means connecting said stake relays to all competitor counters and to the total counter, a separate electric circuit including a competitor relay responsive solely to an electric impulse transmitted from the competitor selector means in the ticket-issuing machine.

8. An electric totalisator installation as defined by claim 7 in which the electrical circuit means is arranged to connect the total counter in parallel with the competitor counters.

9. An electric totalisator installation as defined by claim 7 in which each counter includes at least three electro-magnets connected into said circuit means and representing separate amounts of increasing value from a unit value, of which the others are multiples.

10. An electric totalisator installation as defined by claim 7 in which each stake relay includes a plurality of contacts, and electromagnetic means

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for closing said contacts and operable by the corresponding amount-selecting means of the ticket-issuing machine.

JOHN HANDLEY.

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The following references are of record in the file of this patent:

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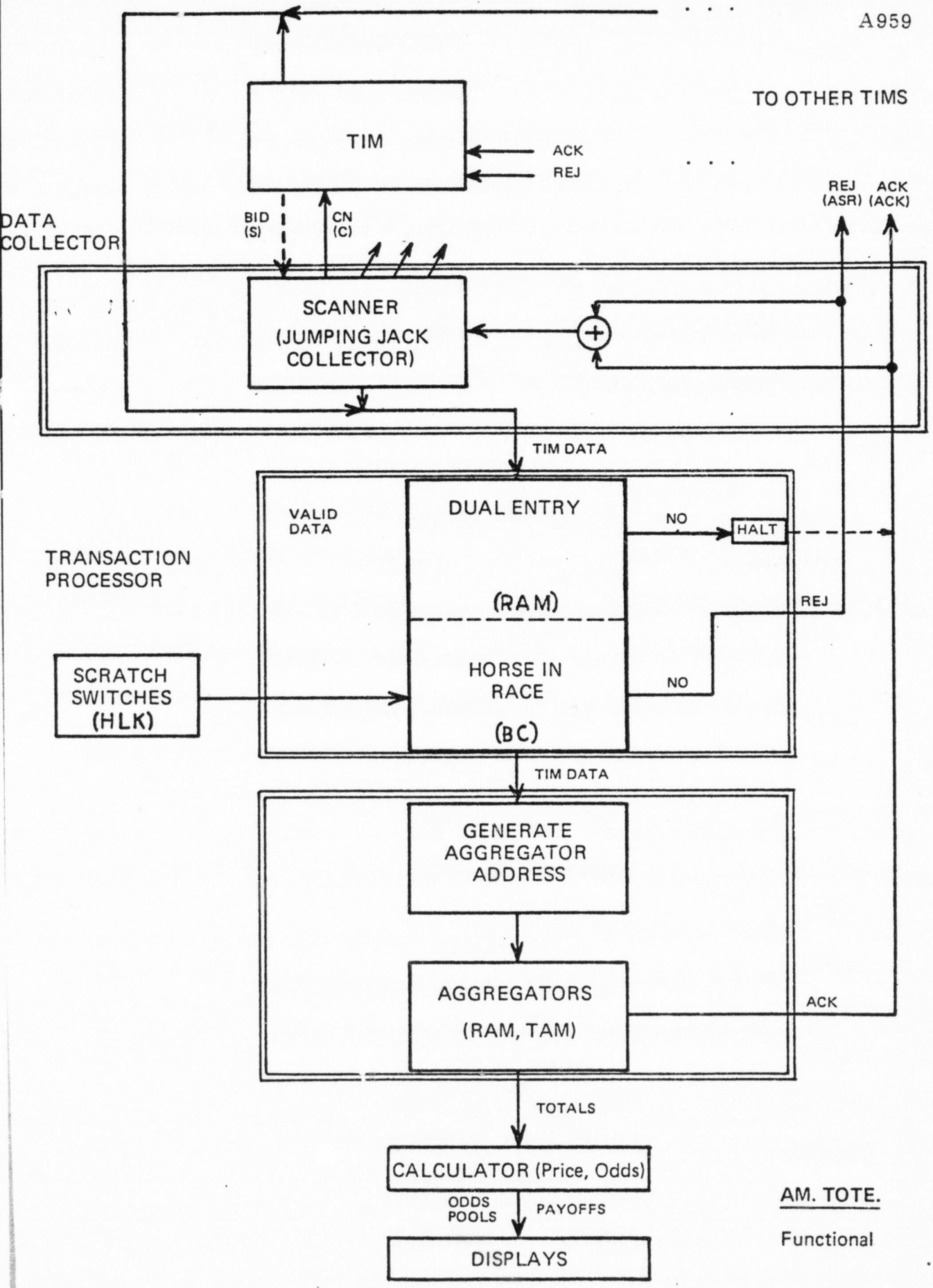

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DEFENDANT'S EXHIBIT # BX NO. 67 C 1119

PLAINTIFF'S EXHIBIT NO. 1

REPORT ON TELEPHONE CONVERSATION WITH ED SHELLY - U.S. INDUSTRIES MARCH 30, 1960.

Ed Shelly called this morning to advise that he reviewed test procedures set forth in prospectus of Digitronics Corporation and he believes that they are of a satisfactory nature for acceptance:

He suggests, however, that they could be made stronger by the following:

1. PARAGRAPH 5.9, Sub-division E - He believes that the provision allowing two mechanical errors in five races is excessive. Believes that this should be greatly limited - to improve upon our experience with American Tote.

2. He believes that a reservoir of power should be provided to eliminate temporary failure on account of power shut-off; that a time limit be set, for example: 20 minutes.

3. Additional sub-division should be added that would state that no other errors except those set forth in previous sub-division can be allowed.

Ed Shelly further pointed out:

1. That he does not see any mention with respect to whether errors are permitted in display system.

2. That he does not seek to pass upon the ability of the machinery to satisfy all of our needs. This is something our personnel must take the responsibility for and suggests that we reserve our right to change or add to the proposed system based upon experience gained from the test of prototype.

3. That we do not permit the use of used cable. That we insist upon new cable.

4. That we check on all Digitronics' installations.

A. L. WEIL

ALW/h

(Section 4.4 modified to specify machine with suitable operating char. and suitable [illegible] char. of ticket readers.

Agreement Exhibit H32 4-2-74 Del.

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DEFENDANT'S EXHIBIT
BZ
NO. 69C 1119

Roosevelt Raceway, Inc.

Annual Stockholder's Meeting

Held at Roosevelt Raceway, Inc.

April 18, 1961

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This is another opportunity which we have in this company: We have been seeking some way to reduce the cost of our totalizator operation. As you know we rent from the American Totalizator Corporation. They rent these to all race tracks throughout the United States. About nine or ten years ago we attempted to develop a tote and we invested perhaps $75,000 in the effort to have it

done but had to abandon it.

Several years ago we discussed the matter of a totalizator with a small electronics company of Westbury, Long Island, a small company that has grown mightily since then. We made an agreement with them whereby they would produce a prototype of an electronics totalizator with issuing equipment which would be competent to operate the mutuels at Roosevelt Raceway or for that matter at any race track in the country. They have worked on this for sometime and they hve just completed a prototype of this equipment which we have seen in operation. It operates to the fullest extent we would require. At the moment it is custom built. Can handle merchandise (Loss)

We have had to close minutes before the race in order to make the necessary computations in this complicated pool. With this we would be able to sell until the very minute the horses go off. This is accomplished through the most advanced methods of computation possible.

It is a company which has grown greatly in the few years we have had contact with them. We have had every component of this machinery fully

tested. We have only prototypes, handmade, now. But when they are put into working models, fully tested, we believe it will be adequate for our purposes at Roosevelt Raceway.

In the meantime, in order to assure continuance of service, we have a contract with the American Totalizator Corporation which has five years to run. During this period we expect we will be able to develop, test and prove this equipment, and we will be able perhaps to sell it or lease it to other tracks, so that when our contract expires we will be able to install this device and thereby save our rental to the American Totalizator Corporation of approximately $600,000 a year. It is based on a percentage. If our business increases it could become more.

I believe we will be able to acquire all of the necessary equipment to operate this plant for a sum far less than that and we will be able to save considerable moneys in our operation, in addition to which we have formed a new company, Westbury Electronics, which will engage in the sale, leasing and distribution of this equipment throughout the

world. We have high hopes that this may lead to many opportunities for Roosevelt Raceway.

With respect to the more immediate business at hand, on May 22, just five weeks off, we will open our 1961 racing meet. On the basis of what other race tracks are doing it looks as if this will be a very favorable racing season. We find that at Aqueduct racing is up 9 per cent in attendance and about 14 per cent in handle. Laurel Race Track is up 11 per cent, Yonkers Raceway has been doing very well. This is all very hopeful for a fine 1961.

In addition to the other factors which go to make a season, last year we had the third and first segments of a new system, dividing our season with Yonkers Raceway. Last year we raced the first and third segments; this year we race the second and fourth segments.

We all know from much experience that the fourth segment which embraces the months of October and November is the poorest racing season of the year. By that time people are a little tired, they are a little short of money and it is difficult to

MR. WEIL: If there are other questions, they may be matters of great interest to the shareholders and it would not be properto shut them off. I appreciate your sentiments.

MR. BERNARD PODHORZER: To clarify the statement you made in regard to the totalizator, with that corporation, was that from Albertson? Roosevelt Raceway has entered into a new partnership with this corporation?

MR. WEIL: Yes.

MR. PODHORZER: To be known as?

MR. WEIL: Westbury Electronics.

MR. PODHORZER: What is the purpose of that corporation?

MR. WEIL: The purpose is to develop, market, sale, lease and promote the use of this totalizator throughout the world.

MR. SALVATORE AVALON: I understand there is a new rule in reference to horses breaking.

MR. WEIL: The breaking of horses is a matter which is one of the plagues of the industry. We seek to limit the number of such horses and we seek to

MR. WEIL: Yes, it has been done.

MR. DAVIS: This expense will not run too high?

MR. WEIL: No, sir.

MRS. ANNA DONOHUE: This new company, is that a subsidiary of Roosevelt?

MR. WEIL: Westbury Electronics is owned 51 per cent by Roosevelt Raceway and 49 per cent by the Digitronics Corporation.

MR. EDGAR WILLIAMS: You mentioned that the issuance of these passes does not materially affect our income. I would like to mention something that I feel does materially affect our income. On every occasion that I visited Roosevelt Raceway I have seen, heard, and been approached by ushers looking to sell seats. Where does the income go: in their pockets or in the company's pockets? I am ashamed that I have not reported it.

MR. WEIL: You anticipate a question sir.

MR. WILLIAMS: I just bring this up because I feel it is the duty of every stockholder to report this.

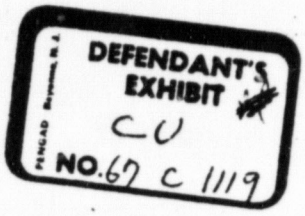
MR. JAMES F. WINN: I am interested in Westbury Electronics for this reason: I would like to know who heads it, what relationship it has to our corporation, and what benefit if any to our stockholders we can expect from this corporation.

MR. WEIL: The company is owned 51 per cent by Roosevelt Raceway and 49 per cent by Digitronics Inc., which is the developer and manufacturer of the equipment. It is not a wholly owned subsidiary of our corporation but by virtue of ownership of 51 per cent of its assets we have a majority of the directors: Mr. Valentine, Mr. Levy, myself, Mr. William Walters are named. The officers of the Digitronics Corporation are: Mr. Eric Haight as president of the corporation, Mr. Albert Auerbach as vice-president of the corporation. The stock is not for sale on any exchange. It has just been organized.

MR. JOHN BURNS: This is intended for our future meetings: Your voice is coming over the microphone wonderfully, but would it be possible at our next meeting to have microphones around so

We have a lot to look forward to. This is a growth company. We have spoken about the Digitronics arrangement, about Auerbach and Leonard. With Haight, they are recognized in the electronic field as engineers, in that field. They finally contacted us and arrangements were made. Haight is a genius. I think he is here somewhere today. He has put in the necessary money. Their business is growing, the stock is going to mushroom. They have developed an electronic totalizator that will revolutionize the tote business, and I am very happy that they are our partners in the development where we have the entire world as our market.

Thank you very much.



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Inter-Office Correspondence

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To Eric Haught From Les Krugman Date 1-21-61

Subject:

This is a copy of the presentation on the tote system which I wrote for the Italian group, after they saw the presentation.

PWH9

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ALL-ELECTRONIC TOTALIZATOR

The All-Electronic Totalizator, marketed by Westbury Electronic Corp. was created by the Digitronics Corporation.

Digitronics has established an enviable reputation in the electronics field, particularly with regard to solid-state (all transistorized) data processing equipment.

The first commercial installation of a solid-state converter (for conversion between magnetic tape and paper tape) was made by Digitronics for the largest stock brokerage firm in the United States, Merrill Lynch, Pierce, Fenner & Smith.

Digitronics converters have been created for world-renowned organizations, including Aluminum Co. of America, Bache & Co., Canadian Pacific Railway Co., Tokyo Electric Power Co., and the U.S. Strategic Air Command.

Digitronics also created the Dial-o-verter System, for the high-speed transmission of data, over regular telephone lines, to and from any number of widely scattered points. Dial-o-verter installations have been and are being made throughout the country, for organizations like Lever Brothers, Kellogg's, Mohasco Industries, the Applied Physics Laboratory of Johns Hopkins University, the U.S. Veterans Administration and Social Security Administration.

Now Digitronics has created the world's first All-Electronic Totalizator. A prototype has been produced and successfully demonstrated.

WHAT THE SYSTEM CONSISTS OF

This All-Electronic Pari-Mutuel System consists of a complete tote center, ticket issuing machines, an infield display board, and other remote display boards around the track.

The tote center consists of a scanner, aggregator, odds computer, payoff computer, tote center display panel, and printout facilities.

The function of each of these elements will be explained in detail at a later point.

ELECTRONICS vs. ELECTRO-MECHANICAL

Totalizators in use at tracks throughout the world are based on electro-mechanical equipment. This type of equipment is large, bulky, and has a tremendous amount of moving parts, such as stepping switches, relays, etc.

In addition to occupying a lot of space, the moving parts constitute a source of trouble. They generate friction, parts wear out and have to be replaced, etc.

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The All-Electronic Totalizator is constructed of pure, electronic digital equipment. There are no moving parts. All elements are solid-state (all-transistorized).

These elements are small and compact. They utilize electronic module cards, the same as those used in rockets, satellites, and space vehicles. They offer compactness, durability and dependability.

FEATURES ARE SUPERIOR TO ELECTRO-MECHANICAL EQUIPMENT

The All-Electronic Totalizator has many features which are superior to the electro-mechanical equipment now in use.

1. It is far more accurate because none of the calculations are done by humans. With an electro-mechanical system, the odds are computed by machines, but the payoff calculations are done by humans. Recently Roosevelt Raceway suffered a loss of more than $10,000 due to an error in arithmetic by one of the clerks. This couldn't happen with the All-Electronic Totalizator because all the calculations are done electronically by the computers.

2. It offers far greater speed. Electronics function much faster than electro-mechanical equipment. All transactions are reported instantly. All calculations are done instantly. As an example, daily-double windows now can close at the very last moment before a race starts.

3. It is far more reliable. There are no moving parts to wear out. There are no errors by humans.

4. It offers more flexibility. The denomination of windows can be changed from the tote center. Daily-double windows can be changed the same way. It copes with scratches, dead heats, etc.

5. ers lower operating costs. Since all the elements are solid-state, and
   s. are no moving parts, maintenance costs are lower.

6. It is less expensive. With the compactness of solid-state components, less equipment is required. There is no need for the hundreds of stepping switches, relays etc. The net result is lower cost.

7. It offers greater mobility. Since there is less equipment, it occupies less space and increases mobility. The system can be installed in a trailer and moved easily from track to track.

SUPERIOR IN OTHER RESPECTS

The All-Electronic Totalizator is superior to electro-mechanical equipment because it is less sensitive to the elements.

Solid-state components are less sensitive to heat, cold, sand and dirt. There are no moving parts to overheat or freeze. There are no moving parts to malfunction when sand and dirt seep in.

Solid-state components are less sensitive to electrical disturbances. They are less sensitive to movement and impact.

This lack of sensitivity to all these factors is one of the reasons solid-state components are used in rockets and satellites.

DOES MORE AND OCCUPIES LESS SPACE

Although the All-Electronic Totalizator performs many more functions than the electro-mechanical system, it occupies only one-third the space.

For example, the electro-mechanical equipment needed for a 500-window track occupies 134 square feet.

For the same installation, the All-Electronic Totalizator requires only 43 square feet -- two-thirds less space.

WHAT IT DOES AND WHAT MAKES IT TICK

At a later point, the function of each piece of equipment in the All-Electronic Pari-Mutuel System will be explained. But first follow the flow of data and activity.

As regular and daily-double wagers are made at the windows, tickets are issued by the ticket-issuing machines. As each ticket is issued, the transaction automatically is transmitted to the tote center. This data consists of the amount of the wager, the number of the horse, and the designated pool.

In the tote center, the data is entered into the memory and is checked for accuracy. It then goes into the aggregator, which accumulates all transactions. From there it goes into the odds computer.

The computer translates all the transactions into dollars and calculates the probable odds. These figures on the odds, including the totals wagered on each horse for each pool, are then transmitted and displayed on the tote center display panel, the infield tote display board, and the remote display boards around the track.

As the odds are calculated and displayed, the figures are printed out on paper. This includes the totals wagered on each horse for each category.

At the conclusion of each race, the payoff computer calculates the payoff. It computes the possible daily-double payoffs and the WIN, PLACE and SHOW PAYOFFS. It calculates the amount due to the track and the state, and allows for "breakage".

All of this, from the time a wager is placed until all calculations are completed at the end of the race, is done electronically -- and the heart of the entire system is the tiny magnetic memory core.

It is this tiny element which permits the computers and other equipment to function so rapidly, accurately and dependably. It is minute in size, but gigantic in its accomplishments.

THE TOTE CENTER

Although we have followed the flow of data and activity provided by the All-Electronic Totalizator, the tote center provides additional facilities worthy of mention.

It copes with scratches, dead heats and other variables.

From the tote center, windows can be redesignated - - a $5 window can be changed to a $10 window, a $2 window to a $5 window, etc.

The tote center can change the number and code the security (anti-counterfeiting) for each race - - it does not have to be done physically at each window.

Because of the speed in handling transactions the tote center permits daily-double windows to remain open until the very last minute before a race starts.

The tote center is designed to handle all size tracks, from the smallest to the largest. It can handle eight 1,000-window tracks as easily as one 10-window track.

WHAT THE TICKET ISSUING MACHINES DO

The ticket issuing machines, designed specifically to function with the All-Electronic Totalizator, perform more functions than their counterparts in electro-mechanical systems.

Basically, they report all wagers and issue all tickets. They report and issue tickets for daily-double wagers as easily as for regular wagers.

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They are fast: It takes each machine one-half second to issue a ticket and report the details of the transaction to the tote center, regardless of how many wagers are being made.

In addition to reporting transactions to the tote center, each ticket issuing machine, at each window, keeps a record of all the transactions for each race. If something were to destroy the entire tote center, records of all transactions could be obtained from the ticket issuing machines.

These machines also permit the conversion from daily-double windows to regular windows in a matter of seconds.

WHAT THE AGGREGATOR DOES

The basic function of the aggregator is to accept all the details of all transactions from the ticket issuing machines.

However, it will reject unacceptable wagers. For example, if a wager is placed on a horse which has been scratched, it will not allow the ticket issuing machine to issue a ticket.

As the aggregator accepts data from the ticket issuing machines, it stores it in the magnetic memory cores. It keeps all data by number of horse, denomination of each wager, and designated pool, such as win, place or show.

In maintaining all this data, it duplicates the records kept at each window by the ticket issuing machines.

WHAT THE COMPUTERS DO

The basic function of the computers is to do all the required calculations, to do them quickly, and to do them accurately.

The computers calculate all the totals for daily-double wagers instantly.

They calculate all the totals for regular race wagers instantly.

They calculate probable odds instantly.

At the conclusion of each race, the computers calculate the payoff to the track and the state down to the last nickel and dime.

To insure accuracy in the transmission of the data from the ticket issuing machines to the tote center, a special checking code is used.

To insure the accuracy of all the calculations, two computers are used, to check every step in each calculation. The calculations are done by both computers, and then all figures and totals are compared to make sure they are accurate. Each computer can do the computation twice to further reduce possibility of error. There are also internal checking features in each computer.

FAST PRINTOUT OF TRANSACTIONS

For immediate use as well as for permanent records, the All-Electronic Totalizator provides the means whereby all transactions are recorded on paper. This is called the "printout". These records include the number of transactions which occur for each horse at each ticket issuing machine (or window).

In a normal operation, the printout of the number of regular wagers made on each horse, at each window, is done at the rate of 10 windows per second. For daily-double wagering, the rate is 0.8 seconds per window.

For a track with less than 400 active windows, the total printout is completed for regular wagers in less than 40 seconds after wagering has ended and windows closed. The equipment also is capable of providing similar printout of the number of wagers placed at each daily-double window.

For regular wagers, the printout will accommodate a total of ten 3-digit transaction amounts for each window. This allows up to 799 wagers to be made on each horse at each window, with means to prevent the seller from recording an 800th wager on a given horse. The daily-double printout will accommodate sixty-four 3-digit printouts for each window, to allow for an 8-horse daily-double operation.

At the conclusion of each race, after the computers have calculated the payoff, the printout will include the following information for regular wagers:

WIN POOL

- Win Pool Computation
- Late Scratches
- Total Win Pool
- Commission
- Net Pool
- Total Payoff on Winning Tickets
- Breakage
- Proof
- Payoff for winning horse for the $2, $5, $10, $50 and $100 wagers, including combinations.
  (In the event of a dead heat, this printout is repeated for the second horse involved.)

PLACE POOL

- Place Pool Computation
- Late Scratches
- Total Place Pool
- Commission
- Net Pool
- Total Payoff on Place Tickets
- Breakage (including minus pool when it occurs)
- Proof
- Payoff for winning horse for the $2, $5, $10, $50 and $100 wagers, including combinations.
- Payoff for placing horse for the $2, $5, $10, $50 and $100 wagers. (In the event of a dead heat, this printout is repeated for the horses involved.)

SHOW POOL

The Show Pool Computation Printout is similar to the Place Printout, except that three horse payoffs are shown:

- Combination Payoff Computation
- Payoff for $4 Comb. on Winning Horse
- Payoff for $4 Comb. on Place Horse
- Payoff for $6 Comb. on Winning Horse
- Payoff for $6 Comb. on Place Horse
- Payoff for $6 Comb. on Show Horse
- Payoff for $10 Comb. on Winning Horse
- Payoff for $10 Comb. on Place Horse

Provision is made for the following categories of race results:

- One horse for win, one horse for place, one horse for show.
- Two horse dead heat for win, one horse for show.
- Two horse dead heat for win, two horse dead heat for show.
- Three horse dead heat for win.
- One horse for win, two horse dead heat for place.
- One horse for win, three horse dead heat for place.
- One horse for win, one horse for place, two horse dead heat for show.
- One horse for win, one horse for place, three horse dead heat for show.

At the conclusion of the first race, after the computers have calculated the probable daily-double payoff, the printout will include the Probable Payoff for each Second Race Horse with the Winning Horse in the First Race.

In the event of dead heats in either the first or the second race, the daily-double payoff is computed manually. For this purpose, the printout of the wager totals by dollar category and by horse will be available.

In addition to the above, the equipment provides Regular Wagering Printout of the Pari-Mutuel Totals, for each horse by each denomination and pool.

It also provides a Regular Wagering Printout of each horse at each window, including the total number of wagers made at each window.

It provides a Daily-Double Printout of the Number of Wagers on Each Combination at Each Window, including the total number of wagers made at each window, as well as the total number of wagers made on each horse at all windows.

In addition, the equipment provides a Daily-Double Pari-Mutuel Totals Printout, showing the first race winner with $2 and $10 wagers for second race horses.

Beyond this, the Daily-Double Payoff Calculation Printout includes the following:

- Daily-Double Computation
- Consolation Pool
- Total Daily-Double Pool
- Commission
- Daily-Double Net Pool
- Total Payoff of Winning Tickets
- Breakage
- Proof
- Payoff for $2 tickets
- Payoff for $10 tickets

ACCURACY OF THE ALL-ELECTRONIC TOTALIZATOR

The experience we have had with solid-state digital electronic equipment indicates that we expect no more than one error in 20,000,000 calculations for each computer.

Since two computers are used, the error rate is the product of both. 20,000,000 multiplied by 20,000,000 results in an estimate of less than one error in 400,000,000,000,000 (400 trillion) calculations.

To illustrate these figures graphically, take an area like Long Island, which consists of approximately 1,000 square miles.

If one nail was sticking up somewhere in this 1,500 square mile area, and a car were to be driven over every inch of the entire area, the possibility of getting that nail in one of the tires - -

— is as remote as getting one error with the All-Electronic Totalizator.

OFF-TRACK OPERATIONS

The All-Electronic Totalizator has been designed to encompass off-track wagering. Important as it is, off-track operations have not been included in this presentation since current regulations forbid such activities in the United States. For that reason, this important phase of track operations is presented as a separate portion of the total presentation.

The link between the track and off-track wagering locations is provided by the Digitronics Dial-o-verter System. Like the All-Electronic Totalizator, the Dial-o-verter System is constructed of pure, electronic digital equipment.

It transmits data at high-speed over telephone lines, to and from any number of widely scattered points. Provisions are incorporated to insure the complete accuracy of data being transmitted.

The equipment automatically checks the telephone line to make sure the circuit is functioning properly before it permits data to be transmitted. A special checking code is used in the data itself, to detect any errors, should they occur. If any error occurs, it is detected and the machine retransmits the corrected data automatically.

Dial-o-verter machines can be installed all over the country, in as many different locations as is desired, regardless of distance from the track. As a wager is made at an off-track location, details of the transaction are sent by the Dial-o-verter machine directly to the tote center at the track.

Now, for the first time, off-track wagers can be included in calculating the probable odds at the track. Since the Dial-o-verter System transmits data at the incredible speed of 1,000 words per minute, there is no time lag due to distance between the track and off-track locations.

The Dial-o-verter System transmits and receives data, as in any form of two-way communications. Therefore the calculations performed by the computers in the tote center are transmitted immediately to off-track locations. This provides the latter with probable payoff odds prevalent at the track, as well as all other information on results, payoffs, etc. prepared by the All-Electronic Totalizator.

SYSTEM FLEXIBILITY

The design of the Pari-Mutuel Totalizator is inherently flexible and, with suitable auxiliary equipment, can be modified to include such features as Quiniella, Quiniella Exacta, and Tiered betting as well as 30 horse fields, even though none of these features are needed in the first full scale system. Advance betting is another feature which can be included.

The design of the system is also flexible in capacity in that the same basic system can be efficiently and economically expanded to include more ticket issuing machines and more display boards, as business at a particular installation may require them.

In the event that off-track betting is part of the system, remote odds displays at the off-track locations can be provided also for those off-track locations where the business warrants it.

Q Do you have any patents other than the patent in suit that bears your name?

A Yes, one in my name from -- I don't remember the date -- the 50's -- on an electronic area detection mechanism and one from the later 50's with a Mr. Edgar Wolf on an address selection system.

MR. YUTER: I offer this.

THE COURT: Marked for identification as plaintiff's exhibit 1.

(Document referred to was received and marked plaintiff's exhibit 1 for identification.)

MR. YUTER: Plaintiff's exhibit 1 is the corrected copy of the patent in suit, Weida et al 3,252,149 filed March 28, 1963 and issued May 17, 1966 for a data processing system with 33 claims.

The investors are Robert L. Weida, Edward Mr. Richards, Evelyn Berezin, Jack Knoll, Philip Rosenblatt.

THE COURT: Are you looking for the one you gave me?

MR. YUTER: I'm looking for the original.

THE COURT: Here is one over here, the one you mailed to me.

MR. YUTER: No, I'm looking for the one with

THE WITNESS: Yes. It is a tote system upon which the -- which relates to the patent.

BY MR. YUTER:

Q Was the patent based on the Westbury tote system demonstrated in March, 1963?

A Yes, it was.

Q Could you briefly describe the nature of the demonstration that you personally saw, how many people were present, and what happened; give us the favor of it, but fairly briefly?

A It was a several-day demonstration. There were various groups of people invited to it, groups of people from various tracks and people from -- other EDP ventors.

I guess Roosevelt stockholders were invited, I think, and it consisted in the public being invited to go up to the window and ask for tickets on whatever entry they were interested in, just as a simulated bet, and therefore, a certain fair amount of business in bet transactions was generated.

The infield board would display, as in a race, the various daily double and regular betting displays required; the local smaller odds, pay-off displays also were operated, tickets were returned to these simulated patrons and the people could see the central equipment in the same

room with the 20 or so ticket machines and could get an over-all picture of the operation by using the ticket machines, observing the operation of the central equipment and looking out the window at the tote board.

THE COURT: No actual races were being run at the time.

THE WITNESS; Everything was there except the horses.

BY MR. YUTER:

Q No money was paid off?

A I don't know of any money transactions involved.

MR. YUTER: I ask to be marked as Plaintiff's Exhibit 6 for Identification, a photograph.

THE CLERK: So marked Plaintiff's Exhibit 6 for Identification.

(So marked.)

MR. YUTER: Plaintiff's Exhibit 6 for Identification is a photograph bearing on --

THE COURT: Who is identifying it? Who is the witness?

MR. YUTER: I am identifying it for the record, your Honor, because it's an exhibit from a deposition of George Ernest appearing on the rear of Deposition Exhibit No. for Identification PX-35, the date 3/12/63

and the initials --

THE COURT: 63?

MR. YUTER: Which is the date that Mr. Ernest testified the picture was taken. It bears the initials of G.E.E., which is presumably George E. Ernest's initials.

This designation on the rear is not on the rear of the copies, but the record should show that it is on the exhibit itself.

Plaintiff offers --

THE COURT: Is this some part of the demonstration machine?

BY MR. YUTER:

Q Mr. Weida, I hand you Plaintiff's Exhibit 6 for Identification and ask you to briefly describe the content of the photo, first indicating whether the gentleman sitting at the desk is someone you recognize.

A That is myself and the picture shows most of the central equipment of the Westbury tote.

You want me to go into more detail?

Q Yes.

A It shows four consoles. I can't read what they were, but I see --

THE COURT: Why don't you --

5 Weida - direct

THE WITNESS: I think I can make it out if I approach.

The two at the left I believe are the computer consoles, the consoles for each computer.

The one in front of me is the system console for over-all control.

The one at the far right is the track console for specifying betting results, scratched horses, race number and so forth.

There is an automatic electric-type writer at the left-hand end of that console array used by the programmers and for receiving messages from the system.

To the left of that is a paper tape output unit. Then looking back of the console area there is a stack of about seven racks primarily comprising the electronics for the two computers and for their associated memories and for the ticket machine memory.

Then to the left, there is a bank of three racks, one for paper tape input-output and the other two concerning track console logic electronics and the logic for the control of the display system.

There are partly visible in back of these -- this array of 10 racks, some racks smaller racks, for

power supplies and functions of that sort, for the system.

I think that about completes the contents of this exhibit.

BY MR. YUTER:

Q Was that the central equipment of the Westbury tote demonstrated in March 7, 1963?

A Yes, it was.

MR. YUTER: Plaintiff offers Plaintiff's Exhibit 6 for Identification into evidence.

MR. ISNER: No objection.

THE COURT: Received.

THE CLERK: So marked Plaintiff's Exhibit 6 in Evidence.

(So marked.)

MR. YUTER: Please mark as Plaintiff's Exhibit 6-A for Identification, a photograph bearing on its back the designation "P.X.-37," which was that number of the exhibit for identification of the Ernest deposition, the date 3/12/63, and the initials G.E.E.

THE CLERK: So marked Plaintiff's Exhibit 6-A for Identification.

(So marked.)

Q Mr. Weida, I hand you Plaintiff's Exhibit 6-A

for Identification, plus a copy and ask whether you can describe from the copy the content of the exhibit which I hand to the Court.

A I see an array of-- a line of about 20 ticket machines. These would be the automatic tote J-10 ticket issuing machines used by Digitronics as the betting transaction entry into the Westbury total system.

I guess that's about the substantial content that we are interested in here.

Q Can you tell approximately how many TIMS are displayed there?

A I believe it's in the order of 20. It's a little hard to count, particularly on this print.

Q Who made those ticket issue machines?

A Automatic Totalisator.

Q Limited of Australia?

A They came from Australia.

Q Is that one of the defendants in this case?

A I understand that to be the case.

MR. YUTER: Plaintiff offers Plaintiff's Exhibit 6-A for Identification into evidence.

MR. ISNER: No objection.

THE COURT: Received.

THE CLERK: Yes, sir.

Now, Plaintiff's Exhibit 6-A in Evidence.

(So marked.)

MR. YUTER: Please mark as Plaintiff's Exhibit 6-B for Identification a photograph bearing on the rear PX-43, which was the exhibit for identification number of the Ernest deposition, the date 3/12/63, and the initials G.E.E.

BY MR. YUTER:

Q Mr. Weida, I hand you Plaintiff's Exhibit 6-B for Identification and ask you to briefly describe the content of that photo from a copy, the original of which I hand to the Court.

A I see in the picture the J-10 ticket issuing machine. Attached to the side I see a magnetic tape recorder to record the transactions that the machine is performing for fall-back purposes.

Is there any other detail -- I think that's about all the detail that I see here.

(Continued on next page.)

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DIRECT EXAMINATION

BY MR. YUTER: (Cont.):

MR. YUTER: Plaintiff offers Plaintiff's Exhibit 6B for identification.

MR. ISNER: No objection.

THE COURT: Received.

THE CLERK: So marked in evidence.

xxx (So marked.)

THE COURT: It has your name right on it.

MR. YUTER: Please mark as Plaintiff's Exhibit 7 for identification, a title page of a deposition of Joseph Lynch, taken for the defendants on -- in the subject case, on Tuesday, April 2nd, 1974, in Sarasota, Florida and comprising, in addition to the

xxx title page, pages 84 through 86.

BY MR. YUTER:

Q Mr. Weida, I hand you plaintiff's Exhibit 7 for identification.

MR. ISNER: If your Honor please, I would like to note an objection at this point. I don't think it is proper to put in an extract of a deposition, isolating certain questions and answers, by way of an exhibit.

Mr. Lynch's testimony is going to be of record.

BS:GA
T6R2 BM

Q Mr. Weida, I hand you Plaintiff's Exhibits 10 and 11 and 11-A, and ask you to explain to his Honor first how claim 20 reads on the patent disclosure.

A Going to item A, it says, "A. A system comprising," and then, under item A, "A plurality of ticket-issuing machines wherein each of said ticket-issuing machines comprises." So A is talking about the plurality of ticket-issuing machines, and on Exhibit 11, the balloon 20-A is pointing to TIM-1 and TIM-N, a plurality of ticket-issuing machines.

Under A, we have item 1, "A plurality of selectively actuatable and latching transaction-selection switches, each associated with a different entry in a race for transmitting a selected-transaction signal associated with the selected entry." And there, balloon 1, under 20-A, points to a typical switch of the N switches, namely, Switch 1.

THE COURT: And it could have pointed to 1, 2, or N in either machine?

THE WITNESS: Right. Then, balloon 2, under 20-A, refers to item 2, which says, "An acknowledgment signal responsive means for issuing a ticket having indicia recorded thereon, which is related to a latched switch."

That is talking about the existence within the TIM block of the acknowledgment signal responsive means.

THE COURT: That is not otherwise illustrated.

THE WITNESS: Only specified in the text.

THE COURT: Yes.

THE WITNESS: And Item B calls out, as you see on the lefthand side of Figure 1-A --

Q Would you read it for us?

A All right. Item B. "Generating means responsive to said selected transaction signal for generating signals representing the entry associated with the particular transaction signal, and representing the particular ticket-issuing machine."

THE COURT: Just a minute. Have you got an extra set of these claims that you can give to the Court Reporter?

THE WITNESS: I did not call out the balloons. So the generating means which are to be responsive to the selector-transaction signal, the selector-transaction signals, are, for example, you can see them emanating from ticket machine N via a heavy line: you can see a selector-transaction signal coming into buffer 1-A, and --

THE COURT: Identified as H-1-N.

THE WITNESS: That's right. So that is the selected-transaction signal in this example.

So we have to use that to produce the generating signals representing the entry into the ticket machine. To do that, we need buffer 1-A, in this case, and we need parts -- so that is why that is flagged by 20-B here.

We need parts within MR-A, which is why that 20-B balloon points to MR-A and points, in addition, to the statement to Figures 2 and 3.

So if we look at Figures 2 and 3, we can see that the buffer output H-1-A is going to enter Figure 2 at the upper left and go into the entry register, which is also flagged by the balloon 20-B, and come out of the entry register, and go into the storage address generator, also flagged by balloon 20-B, come out of the storage address generator, and go into the aggregator address transmitter AAT-A, and that is one part of that two-part input.

The other part needed to generate the addressing signals is produced by the step-pulse generator in Figure 3, which is going to increment the scan count in Figure 2 on the right, which is going to --

THE COURT: Now you have lost me.

THE WITNESS: Okay.

THE COURT: We got as far as the aggregator address transmitter.

THE WITNESS: Yes. And the output of the aggre-

gator address transmitter has two components: One component, one group of signals, characterizes the entry, and that pass is created from the selector-transaction signal by going through the entry register and the storage address generator.

THE COURT: Where is the entry register here?

THE WITNESS: The entry register is at the upper left of Figure 2. It is the heavy black line --

THE COURT: That is where we started.

THE WITNESS: I was kind of backtracking.

THE COURT: I see.

THE WITNESS: We are trying to produce the AADR signals, the AADR signals have two components. They originate from two sources. One is basically that entry register, and the other source is the decoder over at the right of Figure 2. So both those things are funneling into the storage address generator, as you can see from the heavy lines entering the storage address generator, and out of it comes one signal into the aggregator address generator, and out of the aggregator address transmitter you get AADR, which is the addressing signal that we are seeking.

So I think by this means we have enumerated all of the items labeled with the 20-B balloon; in other

words, all of the items necessary to comprise the generating means described in 20-B.

Q Mr. Weida, I believe the Court would like a refresher with the step-pulse.

A The step-pulse is a thing which is advancing the scan count, and moving -- thus, it is responsible for moving this from ticket machine to ticket machine; thus, it is part of the mechanism which produced the count in the scan counter, which is characteristic of the window N that we are now considering, that we are now doing business with.

That scan count has to go through decoder DEC to energize the proper one of the N line out of DEC to produce the proper input to the storage address generator to properly characterize the ticket machine that we are now concerned with; namely, the Nth machines.

THE COURT: But how did we get into control CA, go to the scan counter SKA, the decoder and the step-pulse generator?

THE WITNESS: Well, it's true that --

THE COURT: I thought we were coming in at H-1-A--

THE WITNESS: See, I have to talk about one entry path at a time, so I started with H-1-A.

I could equally have well started --

THE COURT: There was a second emission from

buffer 1-A?

THE WITNESS: No. Maybe if I kind of start all over again -- now that you have been through this once, I can perhaps explain it more clearly, but we are talking about the fact that by virtue of the operation of the step-pulse generator, by virtue of its successive operations, we are not interrogating ticket machine N.

THE COURT: Yes.

THE WITNESS: Therefore, step-pulse generator has had a part in putting its scan count, SKA, in the right state to characterize ticket machine N, and that -- its binary number output energizes decoder DEC so that the Nth output of decoder DEC is now energized, which is consistent with the fact that we are interrogating ticket machine N.

So that bundle of lines out of DEC is -- We have the Nth one energized, and as I say, that is consistent with the fact that we are also interrogating ticket machine N.

Since ticket-issuing machine N had the horse 1-T closed, that means that the interrogate pulse to ticket machine N is going to go through the horse 1 switch on ticket machine N, and is going to produce a selected-transaction signal H-1-N, but for that selector-trans-

action signal to do its part in generating an addressing signal we have to go through buffer 1-A. So we specify that that is part of the 20-B.

We also have to go through the entry register, and the entry register has to feed storage address generator, as well as having the decoder feed the storage address generator. The entry register is contributing the horse entry identification to the storage address generator.

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(continued on next page.)

A (continuing) The decoder is contributing to the ticket machine identification to the storage address generator, and between the two of them, they are contributing to the aggregator -- well, let me start again:

The entry register is feeding the storage address generator, a line that says, We are talking about entry number 1; the decoder has energized its N line, it is feeding the storage address generator, and we are dealing with ticket machine N, and between the two of them they enable the storage address generator to tell the aggregate address transmitter that we are talking about runner number 1 and ticket machine N, so that means that is what signal AADR is now describing. The AADR coming out of -- well, if we look back at figure 1A now, AADR is describing the horse 1, ticket machine N, and now we have described something that is required by the frame of 20B, namely, we have been describing generating means, which is all the items flag with the label 20B, and they are responsive to that H1N signal that went into the first of the 20B means, namely Buffer 1A, and also, the window information, in other words -- well, the old state of the scan counter, the step pulse.

THE COURT: So in a way, the absolute primitive step is the step impulse.

THE WITNESS: Yes, 1, the other one I guess, -- one of them is the primitive step, there was the depressing of the key 1.

THE COURT: But then that just created a state of expectancy measured by microseconds, but a state of expectancy.

THE WITNESS: Yes.

A Now, going onto 20(c):

"Transaction calculating means for performing a calculation on said generated signals and transmitting an acknowledgement signal" -- the AADR signals which we have just been talking about --

"And transmitting an acknowledgement signal to said acknowledgement signal responsive means for issuing a ticket only if the transaction is correct.

Here we are concerned with figure 1B and we see that we are calling out the registers MEMA, we are receiving theAADR generator signal and with the updater, which is going to increment the signals -- the counter brought forth MEMA on the basis of that AADR input, and the calculation is to update those two counts, the pool total and the runner total and to return it to the registers, MEMA, for proper register within MEMA, and "transmitting an acknowledgement signal to said

acknowledgement signal responsive means."

So AKA is the thing which produces the signal which will ultimately result, finally, in the ticket issuance, but only if the transaction is correct, and the transaction is known to be correct by the fact that we got an AADR signal, and we only get an AADR signal if the transaction processor has vouched for its validity by not detecting an error and blocking it.

Then I would go on to claim 21 --

THE COURT: I guess this is a good time of day to stop.

MR. YUTER: Yes, your Honor.

(After some discussion off the record, at 5:05 P.M. a recess was taken until Friday morning, December 20, 1974, at 10 o'clock A.M.)

* * * * *

ROBERT L. WEIDA, having been previously duly sworn, testified further as follows:

DIRECT EXAMINATION

BY MR. YUTER:

Q Mr. Weida, would you take in hand Plaintiff's Exhibits 10, 11 and 11A --

THE COURT: 10, 11 and 11A, okay, I have them, yes.

Q And as a preliminary for today's testimony, would you again apply Claim 20 to the disclosure of the Weida patent?

A All right. Reading from Claim 20:

"a system comprising

"(A) a plurality of ticket issuing machines wherein each of said ticket issuing machines comprises..."

Then looking at Exhibit 11 we see that the 20(A) balloon is pointing to TIM-1 and TIMN at the top of Exhibit 11, to denote the plurality of the ticketing issuing machines.

Then under (A)(1):

"A plurality of selectively actuatable and latching transaction-selection switches each associated with a different entry in a race for transmitting a selected transaction signal associated with the selected entry..."

And for that the balloon under 20(A) with a 1 should read under 20(A) with a 1 is pointing to a typical switch, switch 1 in TIMN, as typical of the switches 1 through N in TIMN or TIM-1 or any of the intervening ticket machines.

Item (2) under Claim 20:

"an acknowledgment signal" --

THE COURT: Just a minute.

THE WITNESS: Yes.

THE COURT: They are selectively actuatable because the man ticket selling can clinch down one button or key and only one?

THE WITNESS: Yes.

THE COURT: In other words, it is like a typewriter, well, a current typewriter, if you hit two keys you foul out, you don't get anything, so it is selective in the sense that he is limited to pushing one button for each transaction, that is if we were not talking about daily double, as we are.

THE WITNESS: Well, we could, but -- well, ticket machines generally are mechanically interlocked, so unless there is something defective you can't select two keys from the same bank.

THE COURT: Yes, I see, I see, because in

TIM-1, which is the daily double machine, he can depress two buttons, but he could not, for example, unless there is some failure of absolute perfection in a particular machine depress two buttons -- wait a minute, wait a minute on one and two from the first bank or one and two in the second bank, we do have to select one number from each bank to the exclusion of the other, and that is what we mean by "selectively actuatable," I take it.

THE WITNESS: I think yes.

Well, I would say "selectively actuatable means you can select anyone, the inhibition of selecting more than one I think is a characteristic of the ticket machine which I think the patent is concerned with.

(continued next page)

THE COURT: Now, how about latching transactions?

THE WITNESS: That refers to the fact that any ticket issuing machine doesn't, unlike a typewriter key, where -- well, like a non-electric typewriter key, you know, like a mechanical typewriter machine where you can depress the key and change your mind and bring it back, with the ticket machine, once you have depressed it far enough it is beyond your control. It latches. You lose control, and you have to wait for the central equipment to make a decision about when it should be -- the ticket machine to make a decision as to when the key should be restored and what the consequent action should be. Each, whatever key you do select, is going to energize a line, a corresponding line to produce a signal on that line in correspondence with the latching key that you have actuated.

That is denoted in Exhibit 11 by the balloon 1 under 20(A), pointing to the key.

THE COURT: Yes.

A Under item (2) of 20(A):

"An acknowledgment signal responsive means for issuing a ticket having indicia recorded thereon which is related to a latched switch...."

And there the balloon 2 under 20(A) is pointing

to the inside of the ticket machine, end box, as a typical instance of a box containing this acknowledgment signal responsive means, and that is typically a solenoid with an associated mechanical linkages to trigger the ticket issuing machine, the ticket issuing cycle to issue the ticket with the corresponding number horse, number or numbers, on it, and to clear the keys and make the machine ready for the next entry.

THE COURT: Now would that be accomplished by the impulse that travels on the CLN?

THE WITNESS: Yes.

THE COURT: Or the REJ?

THE WITNESS: Yes.

A Then going on to 20(B) --

THE COURT: Just before we leave this, although this may not be relevant, which, if it isn't SCNN, is the step signal or does it show in 1A?

THE WITNESS: The step signal I don't believe does not, it does not, it does not show as far as I can see in 1A, it is internal, it is such a signal generated internally to the transaction processer MRA and another like signal generated independently in transaction processer MRB.

THE COURT: Yes.

THE WITNESS: But the step pulse signal is advancing a binary counter which in turn is causing the scanner to successively energize sequential outputs one at a time so in that way the effect of the step signal is felt by the fact that the scanner is going to successively energize the successive interface block, which in turn is successively interrogating the successive picketing machines, thus having depressed the key we are going to get a signal out of ticket machine N, in this example case that will be H1N, and we see that is highlighted by a heavy line from ---

THE COURT: Now I am sorry, could I have the beginning of that sentence?

(The Reporter repeated the sentence.)

THE COURT: Yes.

A (Continuing) -- from ticket machine N to --

THE COURT: There is one thing that I wanted to find out in this, and that is when we look at these, H11, H1N, HNN and HN1, I take it there is associated with each ticketing machine a buffer pair, A and B?

THE WITNESS: No.

I think one way we get into confusion here is that in speaking of the system generally, the system in the patent speaks of N ticket issuing machines and

it also speaks of N buffers, but those two N's are quite different, so the N ticketing machines, let us say, would be of the order of a hundred, the N runners, and therefore the number of buffers, would typically be ten.

THE COURT: In other words, the buffers are associated with the number of places that there are in the starting gate and on each individual machine.

THE WITNESS: Right.

THE COURT: Now let me see, then, what our terminology for the signal H1 is --

THE WITNESS: May I --

THE COURT: H is impulse. I take it?

THE WITNESS: H stands for horse.

THE COURT: Horse?

THE WITNESS: Yes.

THE COURT: And then, the first H, let us take one --

THE WITNESS: Yes.

THE COURT: The first one indicates the window or the horse.

THE WITNESS: The first one indicates the machine.

THE COURT: Yes, the ticket-issuing machine,

right.

THE WITNESS: Correct.

THE COURT: Then the second numeral which can be anything from 1 to N --

THE WITNESS: I am sorry?

THE COURT: That first is the horse?

THE WITNESS: I am sorry, it is easy to mix these up.

Of the two numerals the left numeral, the first one indicates the horse and the second one indicates the machine.

THE COURT: Now wait a minute.

Are you sure?

THE WITNESS: Yes, in other words, if we look at buffer 1A --

THE COURT: That is the way I had it first and then I changed my mind about it. I don't know why.

THE WITNESS: Unfortunately, it is easy because of the terminology to mix them up, but I know by looking at buffer 1A we are talking -- well, I know each buffer refers to a runner or a horse --

THE COURT: Yes.

THE WITNESS: So we see --

THE COURT: Oh, yes, oh, yes.

If we look at buffer NA we see that the N, the constant, and the N1 --

THE WITNESS: Right.

THE COURT: Then the first one is the runner, and let me get that right.

The second one is TIM, and the H stands for both the horse and I take it for our purposes the energizing projection or progression along the wire.

THE WITNESS: Well, the H itself is just a part of that signal, namely it isn't separable.

THE COURT: But the impulse is characterized by all three places --

THE WITNESS: Right.

THE COURT: (Continuing) -- because every impulse along that wire has a character stamped on it.

THE WITNESS: Yes.

I think we are saying that --

THE COURT: Okay.

(continued next page)

THE WITNESS (Continuing) That ticket machine N then is producing the selected transaction signal H1N, in this case, and thus energizes its namesake line which is connected from TIMN to buffer 1A.

THE COURT: Now are we in (B) now?

THE WITNESS: I kind of forget whether I actually read it, perhaps I should read that again.

Under Claim 20(B):

"Generating means responsive to said selected transaction signal for generating signals representing the entry associated with the particular transaction signal and representing the particular ticket issuing machine...."

So now we are starting this signal which was produced by ticket machine N and is entering buffer 1A, and we are looking to indicate the components of the generating means responsive to it, and as a consequence generates signals which represent the runner or entry, and also the representative of the ticket machine; in other words, the generating signals have to be representative in this case of runner 1 and ticket machine N.

So in order to put together these means, we need buffer 1A and we need transaction processer MRA.

Thus we have on Exhibit 11 balloon 20(B) pointing out Buffer 1A and transaction processer MRA, and we see the heavy line between them so they are working together in there as the collective means but inside MRA.

Now this is further detailed in Figures 2 and 3 on Exhibit 11A.

THE COURT: In other words, the signal that emanates from buffer NA --

THE WITNESS: Pardon me, 1A.

THE COURT: 1A.

THE WITNESS: Now the signal, actually the signal --

THE COURT: To the entry register?

THE WITNESS: Yes.

THE COURT: Thence to the storage address generator?

THE WITNESS: Yes.

THE COURT: And thence to the aggregator address --

THE WITNESS: Yes.

THE COURT: (Continuing) -- transmitter and emanates as signal AADR.

THE WITNESS: Yes.

As the text of the patent describes it, what you just followed through constitutes group 1 of two groups of signals, subgroup 1 makes up the group of lines AADR, group 2, the other subgroup, follows from the right-hand side and that is going to be characteristic of the ticket machine, and in order to generate that ticket machine number, which is going to be changed, of course, as we go from ticket machine to ticket machine, we need the step pulse generator, which is shown at the top of page 3, producing the step signal.

That is going to be emitted to KA, thus if you look at figure 2, the bottom of Exhibit 11, the middle of the right-hand side, we see the step going from KA to the scan counter and thus advancing the scan count to represent the window currently or the particular machine currently being handled.

THE COURT: Now does that signal SKNA appear anywhere on Fig. 1A in Plaintiff's Exhibit 11?

THE WITNESS: Yes, but not exactly in this connection. That has got a dual function. One function is to enter the scanner and the other function is to be decoded there through successively scanning the ticket machines.

THE COURT: I see.

THE COURT: We see it going out of the top right of NRA?

THE WITNESS: That is correct.

THE COURT: To the scanner.

THE WITNESS: Right. So that is another function not connected with the present means.

This function, which also utilizes scan Count SKA is to provide signals representative of the TMF to the storage address generator. To do that we have to take this count out of SKA, put it through another decoder, which is substantially physically the same as scanner SKA, and it is called decoder DEC, at the lower right of Fig. 2, and one of its end outputs, one out of one of them, in this particular case the Nth output, that is going to be energized, and now we have stepped into the position of looking at TMN.

So those N lines enter the storage address generator and contribute the group 2 FF lines as long as the storage address generator is enabled to produce an output by the signal GERA.

Now --

THE COURT: Wait a minute. Wait a minute.

THE WITNESS: Yes.

THE COURT: All right.

THE WITNESS: I think I should mention in this connection that the generating means -- it says:

"Generating means responsive to said selector transaction signal."

In other words, that selector transaction signal generates, triggers the whole mechanism in that as we have just discussed it and obviously produces the group 1 signals characteristic of the runner, but it also is the information that is going to get tested in various ways, as we discussed yesterday, by the mechanism in the message register, and thus only if it is valid will we get this GERA signal to emit anything, to allow anything to be emitted from the storage address generator.

THE COURT: Wait, wait, wait a minute.

I see.

THE WITNESS: So we now have the heavy line from the storage address generator to the aggregator address transmitter AATA, a bundle of signals characteristic of runner 1 and ticketing machine N.

The aggregator address transmitter is primarily now going to -- it is getting an impulse from the transaction processor MRA and the transaction processor

MRB and it will select for transmission to the rest of the system the signals either AADRA or AADRB, depending on which side is master, and in this particular example A must be the master, so we are transmitting from storage address generator A through the aggregate address transmitter and producing in either event the signals out of AATA, called AADR, which is intended to signify the aggregator address.

We can return now to Exhibit 11 and observe that AADR --

THE COURT: I see.

Wait.

THE WITNESS: Yes.

(continued next page)

DIRECT EXAMINATION

BY MR. YUTER: (Cont'd.)

THE COURT: The AADRA and AADRB that appear in Figure 2 seem to be going in different directions.

THE WITNESS: Yes. AADRA from storage address generator A is going two places, it's going to its own aggregator address transmitter, it's also going out to the aggregator address transmitter on the B side, which is not shown here. It's also going to the ticket issuing machine address transmitter.

So, whichever side you are on the storage address generator on that side is going to three things.

Its own aggregator address transmitter, the aggregator address transmitter on the other side and also to the -- to its own ticket issuing machine address transmitter, in order the whichever transaction calculator is master it can get the aggregator address from the master transaction processor, so that you could have, for example, the transaction processor on the left side of the master and the transaction calculator on the right side of the master and you would get the necessary signal from one to the other even so.

THE COURT: Going to the heavy line going from the storage address generator to the aggregator address transmitter, if we have to give that a signal identification, would it be AADRA or AADRB?

THE WITNESS: That would be AADRA. If you see that heavy line from storage address generator A to the aggregator address transmitter, that vertical heavy line --

THE COURT: On the left?

THE WITNESS: -- on the left, branches out to the right, as you go halfway across you see that is designated AADRA.

THE COURT: Yes.

THE WITNESS: So that signal designation applies to all of the line -- it happens to be heavy for this illustration, but whether it is heavy or not --

THE COURT: What is that?

THE WITNESS: I am saying that the set of lines indicating AADRA is labeled, but not the part that is -- the heavy line is not directly labeled, but it's part continuous with that horizontal line which is labeled, so, you know, the whole thing takes on the name AADRA.

THE COURT: That is what I realize, but then -- the AADRB line, at least as it looks here, seems to be an input to the aggregator address transmitter.

THE WITNESS: Yes. And to the ticket issuing machine transmitter.

THE COURT: Aggregator address transmitter is what I am talking about.

THE WITNESS: Yes.

THE COURT: And then to the ticket issuing machine? And the same is true of AADRB and -- well, for what it's worth, SADDI, yes?

THE WITNESS: Yes.

THE COURT: We will come to that, I imagine.

THE WITNESS: Now, I guess we have followed the generating signals out of aggregator address transmitter A on -- in transaction processor MRA and returning to Exhibit 11, we see that AADR collection of signals going out of transaction proces- for MRA to registers --

THE COURT: Say that again?

THE WITNESS: We see that on Exhibit 11, the bunch of lines AADR going from -- on the heavy line going from transaction processor MRA to registers MEMA in transaction calculator A. So that is the

result we wanted to produce with these generating means, to create generating means responsive to the selector transaction signal, in this case H-1-N, which are representative of the 1 in H-41-N and also representative of the N in H-1-N.

We have a flag with the designation 20-B, the buffer in figure 1-A and the transaction processor MRA and in figure 2 we flag the step pulse generator and the scan count and the decoder to produce the ticket machine characterization for storage address generator A and we have also flagged the entry register to produce the runner characterization for storage address generator A as well as the aggregator address transmitter, which is the means to the select -- to select the proper storage address, the master storage address for ultimate transmission to the next unit which needs it.

Then we go on to Part C, transaction calculating means for performing a calculation on said generated signals and transmitting acknowledgement to said acknowledgement signal responsive means for issuing a ticket only if the transaction is correct.

The transaction calculating means is entirely on the bottom left of Exhibit 11 and the generated

signals referred to are signals AADR coming into the top of transaction calculator TCA and entering within registers MEMA.

Now, it's the function --

THE COURT: I want to go back a minute. Where is the transaction calculator?

THE WITNESS: If we look at the bottom left of figure 1-B, it's a bit dim in the background there, but you see

THE COURT: Oh, I see. I forgot. That is an aggregate.

THE WITNESS: It includes the aggregating facility.

THE COURT: But it's a whole bunch. It's everything that is included whithin the dotted line is the transaction calculator TCA -- right?

THE WITNESS: Yes.

THE COURT: All those things in there, the error unit, computer A, registers MEMA, updater and AKA?

THE WITNESS: Yes.

THE COURT: All right. Give me a moment here. We need not worry about the same thing -- the same thing is true on the B side, more or less, is that

right?

THE WITNESS: Yes.

THE COURT: All right.

THE WITNESS: Now, the transaction calculating means for 20-C and comprises a sub set of the total group of five blocks in TCA and they are to perform this calculation -- these calculations with respect to the AADR bundle of signals, which in our example characterizes runner 1 and ticket machine N.

On the basis of those signals we are going to perform -- we are going to find where the information, the corresponding information is and for pool total and the runner total and perform a calculation of incrementing both of them and that's the calculation referred to.

For that reason we have then labeled 20-C, attached label C to the registers, to the updater and to the acknowledgement unit within TCA so the registers supply the data to be calculated upon and also contains the mechanism that uses AADR to find those numbers and the updater increments them back to the registers, the correctly selected registers and also tells the acknowledgement unit that since this chain of events started, since we got the AADR

signals, we know that the transaction processor found the transaction was correct and that an acknowledgement that this correct signal has been used to calculate new totals for the selected registers, and we want to transmit corresponding confirm signals finally back to the ticket machine which plays the transaction so the acknowledgement block there is the thing that triggers that process of transmitting the acknowledgement signal back to the ticket machine, to the acknowledgement signal responsive means in the ticket machine.

THE COURT: That is sympolized by the heavy line AACK?

THE WITNESS: We could trace a heavy line path from AKA back to the ticket machine. We can see it going up as the signal AKA to the transaction processor MRA and emerging from transaction processor MRA as the signal CONA which then travels several places by in particular to interface IFN, which is the one that has gotten the energized scan signal, so it's going to let that through and it will emerge as signal CON to ticket machine N where it will trigger the acknowledgement signal responsive means and cause the issuance of a ticket and the:

restoration of the selected transaction signal -- transaction selection switch, unlatch it. Now, we go on to 21?

THE COURT: Just a minute. What energizes all this?

THE WITNESS: I think that the triggering event was the depression of a particular key --

THE COURT: What is the source of the electronic power?

THE WITNESS: Well, the -- associated with this equipment or any other data processing equipment you have a so-called power supply which accept electrical power from the power company and convert it into suitable different electrical power for this kind of equipment, and it has to suitably safeguard it from interruption and regulate the voltage intensity and provide different voltages and different -- in different capacities of current, and so forth.

So, in a way it is a mundane but necessary adjunct to any of the data processing equipment.

THE COURT: Each one of these would or could in principle be separately energized so as to keep things moving along?

9 Weida-direct

THE WITNESS: You mean, for example, that the transaction processor A and the transaction processor B could have separate power sources?

THE WITNESS: It would be a matter of indifference, I take it. No, what I meant, rather, was that, say Computer COMA on the register MEMA could all each have an electrical converter, a somewhat converted electrical inputter from the outside so that as the inputter goes along it may be amplified or whatever so that it keeps moving?

THE WITNESS: Yes.

THE COURT: It doesn't attenuate through accumulated resistance as it gets through there?

THE WITNESS: Right.

THE COURT: None of that is shown. That is just taken for granted, obviously.

THE WITNESS: Right. Claim 21: The system of claim 20 wherein said transaction calculating means comprises (A) register means having addressed aggregation registers for storing the aggregations of transactions.

THE COURT: When we say "transaction calculating means," now we are talking about everything included within the broken or dotted line in figure

1-B.

THE WITNESS: We are starting out to talk about that but we are, for the intent of this claim, we are narrowing it down to focus on a particular sub set.

THE COURT: Yes. But the things that are here are all included within the dotted lines to limit the transaction calculator TCA or B?

THE WITNESS: Yes.

THE COURT: I take it, whatever is said in Claim 21 would be as true of the B side as well?

THE WITNESS: Yes. A, register means having address aggregations of transactions.

We there see that 21 A is pointing to registers MEMA so signify -- the text specifies that that block contains a memory and that this memory is capable, it can be computer words or registers within that memory which are going to serve as the means to aggregate accounts and these -- each of these registers can be addressed by the AADR signals impacting or going into the address selection circuitry in MEMA, and that thus we have registers to store the accounts and means to select the registers to find the nymbers that we want to do a calculation on. Then 20 B --

DIRECT EXAMINATION

BY MR. YUTER: (Cnt.)

Q 21B.

A Pardon me. Means responsive to the signals generated by said generating means for selecting the addressed aggregation register. That is pointing to the same block and it's described in the function of reacting to the AADR bundle of signals as presently energized to select the registers corresponding to them to find the numbers that we wanted to do a calculation on.

Then, C, means for reading out the contents of said selected addressed aggregation register.

Having addressed the correct registers one at a time we have to have means within MEMA, this memory system, to read out what has been selected so that it's available for calculation. And that's what these means are, to extract from the selected memory register the contents to serve as input to the calculation.

We have the baloon 21 C pointing to MEMA for that function. It's pointing to the exit from MEMA to signify that these are the means of extracting from it what you want.

Going to 21 D, means for updaing the contents of said selected addressed aggregation register.

THE COURT: Could you pause for a moment.

MOA is what, Memory output?

THE COURT: Correct, memory output from A. So having gotten the MOA output from the selected register D is describing means for updating it and that -- thus we have 21 D pointing to updater UAA which can take the word or words selected from the registers and increment each by 1 to signify the effect of the bet under consideration.

Now, part E means for returning said updated contents to said selected addressed aggregation register.

The updater which now has the incremented total of the runner -- count of transactions on this runner, that is transmitted by the heavy line up to registers MEMA and we have a balloon 21 E pointing to the spot at which that signal -- you can't see it there, but it's partly obliterated but it's MIA where the balloon points to the point where MIA enters MEMA. That is the signal --

THE COURT: What is the symbology there, memory input?

THE WITNESS: Yes.

So register -- per 21 E, registers MEMA must

have the means to accept what is coming back from the updater and return it to that same register that we selected in the first place.

THE COURT: Is that the 64 by 64 by 25, I think it was, that you were telling us about?

THE WITNESS: Yes. With its associated -- MEMA includes that core establishing itself plus the associated address selection circuitry and read-out circuitry and circuitry to reinsert a new number and control signals to stimulate it properly.

THE COURT: And that is a complete component so that the question here is how to utilize it not how to create it?

THE WITNESS: Yes.

Part F, the last part of Claim 21 reads, "means for transmitting said acknowledgement signal to the acknowledgement signal responsive means when said updated contents are returned to said selected addressed aggregation register."

So the updater is going to send the updated information back, it's also going to trigger the acknowledgement unit to create the signal ACKA, which we see on the heavy line and flagged by 21 F is sent back from AKA in TCA to the transaction processor MRA

and that's the means for transmitting that acknowledgement signal ACKA on its way toward the acknowledgement signal responsive means in the ticket issuing machine.

It will travel, as we said before, via CONA and via CON to the responsive means in the ticket machine.

THE COURT: Just a minute, please.

MR. YUTER: Your Honor, as an aside, I believe that you may want to see what one of these cores look like in the core memory, and if you like we could introduce it as an exhibit.

THE COURT: That doesn't tell me much of what it looked like.

MR. YUTER: You can see the size, though.

THE COURT: Yes. But that is, you tell me, 64 by 64 by 25.

MR. YUTER: No. Let me mark it.

THE CLERK: So marked Plaintiff's Exhibit 12, a photograph.

(So marked.)

MR. YUTER: Which is a photograph of a hand holding what looks like a very small lifesaver, a core.

BY MR. YUTER:

THE COURT: I diverted you, I'm afraid.

THE WITNESS: I think we were in the course of 21A but I don't think we had gotten any further.

THE COURT: We were getting down to E.

THE WITNESS: Maybe we did finish -- no, I don't think so.

THE COURT: We got to ACA --

THE WITNESS: I don't remember.

THE COURT: I think we got all the way through F. Let's have a short recess.

(Recess taken.)

THE COURT: You may proceed.

THE WITNESS: We are to start on Claim 22 now, I guess. "The system of Claim 20 further comprising a ticket issuing machine memory comprising:

"(A)"-- and the ticket machine memory is on Exhibit 11 in the center, the top of Fig. 1B.

Part (A) --

THE COURT: Just a moment, please.

THE WITNESS: Part"(A): A plurality of addressed memory positions each storing the number of transactions made by a ticket issuing machine."

So we -- of that window memory WM we would be occupying typically as many positions of it as there

are ticket machines at the track if we are just storing the totals by ticket machine, and of course, substantially more of the alternative of storing as well the transactions for each entry or entry combination at each window.

THE COURT: Could you read that to me?

(Record read.)

THE COURT: That would mean that you had one ticket issuing machine memory common to all the machines on the track?

THE WITNESS: You could, but I think that what -- well, no, not all the ticket machines. I think the emphasis in the claim is that if you have 100 machines then you are going to have, let's say, 100 memory locations, if you want to do them straightaway, 100 memory locations,each one to contain the total number of tickets issued so far from that machine for this race.

And then the additional complication described in the patent is that, for example, let's say that we are not handling daily double, just to simpligy it. If you wanted to,as well, on a ten-entry system also store the number of bets on each entry at each ticket issuing machine --

THE COURT: What I'm after is that the idea that whether it's comprised in one machine or not, there must be a separate pile of recollections for each issuing machine.

THE WITNESS: Yes.

THE COURT: Whether it's all on one core or in a thousand cores, one or a thousand machines, but you must be able to have such an array or memory positions and they must be selectable so that you can allocate one to each issuing machine and get it to respond to a demand that it yield its data.

THE WITNESS: Yes.

THE COURT: All right.

THE WITNESS: "(A) a plurality of addressed memory positions each storing the number of transactions made by a ticket machine."

We have 22(A) pointing to the element WM, to signify that.

For 22 (B), "Address-selection means for receiving the signals generated by said generating means for selecting the particular memory position associated with the particular ticket issuing machine."

So the transaction processor MRA you can see on Fig. 2 contains a ticket issuing machine address transmitter generally similar to the aggregator

address transmitter previously described, which is going to transmit this bundle of lines characteristic of the -- or identifying the ticket machine that is being interrogated now.

So WADR is going to transmit that information to the ticket issuing machine memory so that we can -- the memory can select a register location corresponding to that ticket machine.

I think that kind of covers what we wanted to say about (B).

"(C) --"

THE COURT: Wait a minute.

That is about (B)?

THE WITNESS: Yes. 22(B) is a balloon directed to ticket issuing machine memory WM and it does -- would contain address meands to react to the bundle of signals WADR which characterize ticket machine N and enable the address selection circuits to find memory locations corresponding to machine N and bring out that information.

THE COURT: What does the WADR symbols --

I know you said it once before.

THE WITNESS: Window Address. That is opposed to aggregator address for AADR.

THE COURT: I take it that that must function somewhat like what you were describing before for the MEM?

THE WITNESS: I don't know whether I mentioned it before, but in the Westbury Tote the modules, modules and modules used in the ticket machine memroy were interchangeable withthose used in the MEMA registers assembly.

THE COURT: What do we call those, memory module?

THE WITNESS: Yes.

That is to indicate that in this application as in others you need a differing -- speaking of these 4000 word chunks of memory, in some rudimentary application perhaps you will need only one. For a very large installation where you are doing a lot of involved displaying and calculation you'd need a greater number, just depending on the ticket machine capacity of the track, and, as I say, the elaborateness of the display or whatever, elaborateness of the kind of bets that you are dealing with and so forth.

Then going on to 22 (C), "reading means for reading out the contents of the selected memory position."

There we have 22 (C) directed toward the exit point from ticket issuing machine memory WM to signify the fact that we have to have those circuitry that we alluded to before for getting out the selected -- the contents of the selected register position to make it available for computation.

In part (D) --

THE COURT: Read that to me, please.

(Record read.)

THE WITNESS: Then"updating means for "--

THE COURT: Wait just a minute before we go one, is that -- WO is for ticket issuing machine memory output?

THE WITNESS: Yes.

And then -- going to to 22 (D), "updating means for updating the read-out contents"and the balloon 22 (D) is directed toward the updater UAW at the upper center of Fig. 1(b).

Receiving the word of output from the ticket issuing machine memory, the updater will now increment it by 1 to be able to creat the current count of tickets sold at ticket machine N.

Then going on to --

THE COURT: Just a minute. That gives us WI. For ticket issuing machine memory input?

THE WITNESS: Yes.

Then going to to 22 (E), "returning means for returning the updated contents to the selected memory position."

The signal -- bundle of signals WI. Go from the updater to the ticket issuing machine memory proper and, as indicated in "(B), we had address selection means which find the desired memory --

THE COURT: As indicated in what?

THE WITNESS: Well, now we have got the updated number and the address selection means must select the place that it's going to go back to and to put that number back we, for example, would have to not only address that location but, for example, properly energize these -- the appropriate digit windings in that core memory assembly.

So those are among the means for getting the updated number back into the ticket issuing machine memory.

For that purpose 22 (E) is flagging the entrance of WI into WM.

Going on to 23 --

BY MR. YUTER:

Q One moment, please.

A Yes.

THECOURT: I think we need another exhibit.

MR. YUTER: Yes, sir.

Would you please mark for identification as Plaintiff's Exhibit 14 a drawing bearing title, "Non-allowed Runner EDP Sub-System Invention (Claim 23)."

THE CLERK: So marked.

(So marked.)

MR. YUTER: Also, please mark as Plaintiff's Exhibit 14A for identification another drawing which is Sheet 2 of the claim application drawing of Plaintiff's Exhibit 14.

THE CLERK: So marked.

(So marked.)

BY MR. YUTER:

Q Mr. Weida, I hand you Plaintiff's Exhibit 14 and 14A for identification and ask you to explain the application of Claim 23 to the patent disclosure.

A Claim 23 (A), "A System comprising a plurality of ticket issuing machines where each of said ticket issuing machines comprises N--looking at the Exhibit 14 Claim 23 (A) is flagging ticket machine 1 and ticket machine N to signify the plurality of ticket issuing machines.

"(1) A plurality of selectively actuatable and latching transaction-selection switches each associated with a different entry in a race for transmitting a selected transaction signal associated with the selected entry."

THE COURT: That's the same as the claim language of 20, is it?

THE WITNESS: Yes.

Should I go into further detail on that or pass by that?

THE COURT: Well --

Q I think it would be helpful to repeat.

THE COURT: It's 20 (A) 1, isn't it? Whether or not we repeat the explanation, I want to make sure that that is identical verbiage to 20(A) 1, isn't it?

MR. YUTER: It is identical, your Honor.

THE COURT: Intentionally so?

MR. YUTER: Yes, sir.

THE COURT: Now, there we have -- go ahead.

THE WITNESS: Okay.

Going on to part 2 then: "a rejection signal responsive means for unlatching any latched switches."

So the balloon (2) under 23 (A) is directed

toward the box TIM in which is then understood to contain the rejection signal responsive means so that whichever key we depressed if the transaction is being rejected the REJ signal will be sent to that ticket machine and stimulate the rejection signal responvie means to clear the keyboard without issuing a ticket.

THE COURT: I take it that mechanically the issuance of the ticket also unlatches the --

THE WITNESS: Yes, it does.

THE COURT: So that this has to be differentially unlatching mechanism.

THE COURT: Yes.

Item (3), "and an acknowledgement signal responsive means for issuing a ticket having indicia recorded thereon which is related to a latched switch."

THE COURT: That is the same as (A) 2, 20 (A)2?

MR. YUTER: Yes, your Honor.

THE COURT: So that sort of sets up the dilemma, right?

THE WITNESS: Going on to (B), "switch means which comprises a plurality of selectively actuatable transaction-prevention switches for generating non-allowed signals associated --

THE COURT: I take it that is for generating non-allowed signals?

THE WITNESS: Yes.

"-- associated -- well, oaky. "-- associated with entries upon which transactions will not be allowed."

23 (B), therefore, the balloon for that points to a place within console (c) in the center of Fig. 1 (a) on Exhibit 14, and it's pointing toward SKW-1, which -- pointing at the legend SKW-1. And to the general vicinity of the three switches shown, which typify N switches, SKW-1 through SKWN.

The switch means then allow --

THE COURT: And there again we are talking about three dots, N being the number of post positions?

THE WITNESS: Yes.

So by operating a particular switch for a given race before and during that race -- during and during the betting for that race we may be energizing one or more as the circumstances indicate, but each time we energize a switch we are generating a steady signal to indicate to the system that this is a so-called non-allowed signal associated with the corresponding runner.

So if we operate SKWn, that means that we do not want -- we do not want transactions on the nth entry, and we will be energizing line SKRn for use by the rest of the system.

(continued next page.)

DIRECT EXAMINATION

BY MR. YUTER: (Cont'd.)

THE COURT: Let's see if I can find that.

THE WITNESS: That is toward the right. It's over toward the --

THE COURT: All right. I have it.

THE WITNESS: So, on the other hand, the passage of that bundle of signals from the console to transaction processor A is shown by the heavy line.

THE COURT: Because we are following transaction A rather than B, so actually the markings happen on the B wing.

THE WITNESS: Right.

THE COURT: But the efferent is just from below SKW -- the SKWN handle or pivot, whatever that is, and that's the SKRN signal and the one that we are going to follow, the one that goes to MRA.

THE WITNESS: Yes.

THE COURT: That SKRN means in a way scratch horse N?

THE WITNESS: Yes. Although that line is representative of a bundle of N lines, so that you can --

THE COURT: It could be from a dozen windows.

THE WITNESS: It could be for, let's say, anyone or all -- well, not quite all, but anyone or a number of , say, 12 entries.

THE COURT: I didn't know that there was a race that the horse ran all by himself -- wasn't it Count Fleet years ago?

THE WITNESS: I think when they get below a certain number they won't allow betting.

THE COURT: It was just an exhibition at that point. But they have had match races. Anyway, go on.

THE WITNESS: The "switch means" are those switches and that produce the bundle of signals SKRN going down to C, comparing means for comparing a selected transaction signal with the non allowed signals to generate a job transaction signal when a particular transaction signal and the non allowed signal represent the same entry.

Looking at the --

THE COURT: Should it be -- comparing means for comparing the selected transaction signal with the non allowed signal to generate a non transaction signal when and only when a particular transaction signal and a non allowed signal represent the

same entry. Is that the idea?

THE WITNESS: Yes. In figure 1-A at the left the balloon points to buffer 1-A and transaction processor MRA indicate that the comparing means include the buffer, which accepts the selected transaction signal, H-1-N, plus components contained in MRA and durther described in figure 2 of MRA.

So to see the rest of the comparing means we go to figure 2 and there the 23-C balloons call out the entry register and the test for non transaction block.

So, the output from buffer 1-A, H-1-A in this case, is seen to enter the entry register and by transmitted bit entry register as 1-HR-1 to the non transaction block. The other entering input in this case to the test for non transaction block is SKRN, which we have just seen generated by the console.

So, now we have the bundles of signals -- pardon me, well, we are really concerned with 1-HR-1 now and comparing that against -- to see if it has a match among the SKRN signals, which it would if the SKR-1 signal were energized indicating that we had a non allowed signal for entry number one.

If that were the case, then this comparitor would energize its output SKRI and thus we have a preparing means for comparing the selected transaction signal, H-1-N, with the non allowed transaction signal, in this case SKR-1, to generate a non transaction signal, SKRI. When the transaction signal and the non allowed signal represented the same entry, in this case, runner 1.

THE COURT: In this case --

THE WITNESS: In this case runner number one.

THE COURT: You said SKRI?

THE WITNESS: I take that vertical line to be an I; yes.

THE COURT: Rather than a 1?

THE WITNESS: Yes.

THE COURT: That would mean input --

THE WITNESS: I believe so. 23-D, rejection means responsive to a non-transaction signal from said comparing means for transmitting a rejection signal to the rejection signal responsive means of the ticket issuing machine for unlatching any latched switches, and --

Thus we see on figure 21-E right, -- we have specified 23-D as applying to KA and we are

indicating that SKRI, which indicates that the present transaction ought to be rejected because it's a transaction on a scratched entry, we are saying that inside the control KA that it's going to cause a reject signal. As Exhibit 14-A indicates, at the top right of figure 2, that reject signal is going to get to IFN and that's NIFN and that's further described on figure 1-A.

That is , we can see REJA on the -- coming out of the transaction processor MRA at the middle top of the box and it can be traced back to IFN, which is also flagged by a 23-D balloon, and out of IFN comes the REJ signal to be transmitted to ticket machine N, where it will stimulate the rejection-signal responsive means to unlatch, for example, key one, which is latched when the seller depressed it to enter a bet on the scratched entry runner number one.

EK fls.

(Continued on next page.)

"A system comprising:

"(A) A plurality of ticket" --

THE COURT: Wait a minute.

THE WITNESS: Yes, sir.

THE COURT: Let me turn the page here.

MR. ISNER: Just a moment.

You gave us two copies of the same thing.

THE COURT: That won't do.

MR. YUTER: That is correct, that is 15 (indicating).

(Mr. Isner handed Mr. Yuter a document.)

THE COURT: Are we all set?

MR. ISNER: No.

THE COURT: You can't go without the tool, they don't look anything alike.

(Mr. Yuter then handed Mr. Isner an exhibit.)

THE WITNESS: 24, "A system comprising:

"(A) A plurality of ticket-issuing machines each including a plurality of selectively actuatable transaction selection switches each associated with a different entry for transmitting when actuated a selected entry transaction signal associated with a selected entry to an output line when the ticket issuing machine receives an interrogation signal."

On Exhibit 15, then, 24(A) balloon flags TIM1 and TIMN as the plurality of the issuing machines, of ticket-issuing machines, and each has the plurality of switches, one for each entry, which will transmit when actuated the selected transaction signal H1N, if TN is depressed, and that signal will be transmitted from TIMN to buffer 1A, but as the claim says, when the ticket-issuing machine receives an interrogating signal.

So the interrogating signal SCNN must enter TIMN in order to go through the depressed switch 1 of TIMN and cause TIMN to emit the selector transaction signal H1N.

THE COURT: The transaction signal H1N?

THE WITNESS: Yes, sir.

THE COURT: All right.

THE WITNESS: Going to (B):

"Scanning means for sequentially and periodically selecting each of the ticket-issuing means for interrogation."

Corresponding to that we have 24(B) on Fig. 1A, directed towards console C transaction processor MRA and within transaction processor MRA. The exhibit indicates we have to go further --

THE COURT: To do what?

THE WITNESS: The exhibit indicates that 24(B) is to be a part of the means, but since inside it it says go to Fig. 3, that indicates that we want to go through the details of MRA in Fig. 3 to further describe the means, but out of MRA is going to come a signal to scanner SCA, which is the final component of the scanning means.

The inclusion of the console is to indicate that an initially clear switch, there SIC, is among other things used to start up the system because when operating it is going to give us the ICL signal emerging from console C and going into MRA, and we will see that is going to cause the first step signal to get --

THE COURT: Could you stop there?

Mr. Karr, could you pick that up?

(The Reporter then read back part of the witness' testimony."

THE WITNESS: (Continuing) -- to get the scanning means into operation to start it up.

If we look at Fig. 2, then --

THE COURT: Just a minute.

Okay.

THE WITNESS: If we look at Fig. 2, then we will see first on the right-hand side, that right-hand side, that ICL is going to go into the scan counter to clear it for starting with the very first ticket machine.

THE COURT: Now wait.

Is that the ICL that is indicated at the extreme right?

THE WITNESS: Yes.

THE COURT: And it isn't in heavy ink?

THE WITNESS: Yes, it is -- well, it is an essential, it is an essential application of the signal ICL, but somewhat perhaps secondary, its use there is to --

THE COURT: I just want to make sure I have the right ICL.

That goes into the scan counter SKAY?

THE WITNESS: Yes, sir, and it also is inside of KA -- oh, pardon me, ICL should be entering controlKA, although I don't see it at the moment.

THE COURT: It has got to be somewhere.

MR. YUTER: Let me indicate.

(Mr. Yuter then indicated on the blackboard.)

THE WITNESS: Right.

If you look at the top left of Fig. 3, you will see ICL entering the block 01.

THE COURT: Yes.

THE WITNESS: Where it --

THE COURT: Yes.

THE WITNESS: Where it comes out and produces a step signal out of the step pulse generator, and step again, as we have seen before, is going to go from control KA, as you see it on the right-hand side of Fig. 2, into the scanning count and is going to serve to pulse the scan count for the first time and get this repetitive chain of events started.

MR. YUTER: Mr. Weida, could you briefly explain --

THE COURT: Just a minute now.

Okay.

MR. YUTER: The function of the ICL going into scan count SKA and the whole concept of initial clear --

THE COURT: Whole concept of what?

MR. YUTER: Of initial clear.

A ICL stands for initial clear line, and when any such system is turned on it could be, or if you want to restart it, it could be in an arbitrary state as the flip-flop memories in it could be possibly in any particular situation, any situation energizing to one or energizing to

zero, so this switch, then, takes care of all of the housekeeping of putting all of the logic and electronics in a proper initial state and of causing the initial action to make the thing start together.

Its function in this case relative to SKA, as I say, is to put the scan counter in its proper initial state and then step it to the position for the first ticket machine.

I guess we will then have seen that console C, which is flat, gets the scanning mechanism started by generating ICL, and we have seen the scan counter is going to get stepped or advanced from position to position sequentially by the step signal and produce SKNA, so SKA is flagged by 24(B), and we can see that on Fig. 1A the SKNA lines which is characterized by a binary number which represents the scan count.

Now that is going to go into scanner SCA, and scanner SCA is going to take that pattern of 1's and 0's and energize a corresponding proper single line out of its N output to select the proper next interface, and thus perform the scanning process.

THE COURT: Now what do we call the line leading from scanner SCA to ISN?

THE WITNESS: That is SCNA, I believe -- pardon me, SCNNA.

THE COURT: I see it. I see it.

Just a minute. And that means?

THE WITNESS: That means SCN~~S~~ for scan, N for the nth ticketing machine and A for side.

THE COURT: All right, all right.

THE WITNESS: Now, going on to (C):

"Interrogating means" --

THE COURT: Wait a minute now.

Well, then, that goes through IFN and comes out as SCNN?

THE WITNESS: Yes.

THE COURT: There is an interface for each window?

THE WITNESS: Yes, sir.

"Interrogating means for generating an interrogation signal for transmission to the selected ticket issuing machine."

And that is -- well, for that purpose 24(C) is flagging the IFN because the sample deals with ticket machine N, and inside IFN there is going to accept the signal scan NA or SCNNA, and put out because it is -- well, that will cause it to emit under the proper circumstances the signal SCNN to the ticket machine in order that the ticket machine be

probed for any activity.

THE COURT: Now that is a different interrogation signal?

THE WITNESS: Different, in what respect different? I am not sure --

THE COURT: Different from the one that picked that -- that rambled through the ticket issuing machines to pick up that impulse.

THE WITNESS: No, that is the same one.

THE COURT: The same one?

THE WITNESS: Yes.

THE COURT: In other words -- yes, I see.

That is because we are dealing with a closed system?

THE WITNESS: I beg your pardon?

THE COURT: That is because we are dealing with a closed system?

THE WITNESS: Yes.

THE COURT: Yes.

THE WITNESS: Going on to (D) --

THE COURT: Now just a minute.

THE WITNESS: Yes.

THE COURT: Yes.

THE WITNESS: Going on to (D):

"Sensing means for sensing for a selected entry transaction signal...."

And looking at Fig. 1A we again have buffer 1A which is accepting the selected entry transaction signal, and also MRA, and the caption (D) directs us to Fig. 2, so looking at Fig. 2 we see that 24(D) is flagging the transaction made block BNA, so the selector transaction signal --

THE COURT: Just a minute. Just a minute.

Yes.

THE WITNESS: So the selector transaction signal H1N --

THE COURT: What?

BNA?

THE WITNESS: Yes.

THE COURT: What is the idea behind that?

THE WITNESS: Oh, bet made from side A.

THE COURT: Just a minute.

All right.

THE WITNESS: So the selector transaction signal goes into buffer 1A, buffer 1A is a part of the means --

(continued next page)

EK:Jk
5AM R3

THE COURT: Wait a minute, now.

Oh, we are starting back again?

THE WITNESS: Yes.

And produces H1A, which we see on Fig. 2 is going to enter the transaction made block and produce BMD, and that constitutes sensing of the signal, that is if we got any one of the signals H1A through HNA, any one of them would produce the output BMD from the transaction made block and would be sensing activity as specified. It would be sensing for selected entry transaction signals as specified in 24(D).

THE COURT: Now where do we go from there? We got to transaction made block.

THE WITNESS: Yes.

THE COURT: Are we really through with the (D) at this point?

THE WITNESS: Yes.

THE COURT: We don't go to KA at that portion?

THE WITNESS: No.

THE COURT: In this portion of the claim.

THE WITNESS: Right.

24(E):

"Means for stepping said scanning means to the next ticket issuing machine when said sensing means

does not sense a selected entry transaction signal."

And on Exhibit 15 it simply calls out, the balloon signifies transaction processor MRA and says to Fig. 3, well, Fig. 3 indicates the details of the claim, the means are detailed on Fig. 3.

If you look at Figs. 2 and 3 on Exhibit 15A it is pointing out control KA on Fig. 2, that as well as to several items on Fig. 3, and that is just to say these are items specifically within KA.

Now, looking at the top of Fig. 3, we see the 24(E) is flagging three blocks, A1, O1 and step pulse generator, so --

THE COURT: Wait a minute. Yes.

THE WITNESS: So we are trying to get the means by which the scanning mechanism is going to go right by a window or ticket machine which has no business to transact.

If we are just interrogating ticket machine N with scan N and no keys are depressed, then we have not gotten any selector transaction signal, we would not have gotten any signal out of any, for example, 12 buffers, and because of that we do not have generated any BMD signal, and that being the case the logical next will be BMD prime energized to signify

that no bet is being made.

We see that BMD prime is used at the upper left of Fig. 3 and is going to A1, although the TFB, which means test for bet, so TFB is the right time for this situation to look at BMD prime, and if BMD prime is energized, meaning no activity at the ticket machine, then A1 will transmit to O1, which is just a funnel, a logical funnel, so it will just transmit to the step pulse generator and give that immediate step from ticket machine N onwards, and that then is the means for stepping the scanner to the next machine, because machine N had no selection and was not generating any selected entry transaction signal.

(continued next page)

FK:tr
6/1

Q Mr. Weida, as background referring to figure 3, would you explain the functional differences between A1 in the upper left-hand corner and O1 to the right of it?

A They are two of the basic logic elements in any --

THE COURT: Any?

THE WITNESS: Electronic data processing system. The A signals are "and" and the O signals are "or", together with the ability just to say not, just as we have BMD prime meaning Not Bet Made. So these are the primitive logic elements of an electronic data processor.

THE COURT: So that A1 is what in the language of the specific ~~called~~ an "And Unit"?

THE WITNESS: Yes, right.

THE COURT: And O1 is what is called in the language of the specific ~~an~~ an OR unit?

A Right. So the primitive logical elements you get out of the A or And Unit is only if the BMD prime ~~compute~~ bet and the TFB inputer are energized.

THE COURT: Let me see about that for a minute. If you got a test of that impulse and a Not Bet Made then they activate the And Unit?

THE WITNESS: Yes. And if only both are

energized do you get an output, so it is a basic element of information making a decision in the data processer.

Another basic element is right there next to the 01 which is the same. It is going to be stimulated if any input is stimulated. So it says that I will generate an output if A1 is energized or if SKRI is energized or if TICL is energized of if COMA is energized. So it is put in there because you want any of those events to produce the step event.

THE COURT: And that is what in the language of the specific is indicated by a plus sign?

THE WITNESS: Yes, right.

I guess that concludes 24E.

Going to Claim 25: "The system of Claim 24 further comprising means for processing entry transaction signal sensed by said sensing means for the steping of said scanning means to select the next ticket-issuing machine."

THE COURT: Just one moment. What is the antecedent of "said sensing means" or is it antecedent in Claim 24? Does that refer to Claim 24D?

THE WITNESS: Yes.

THE COURT: Now let me read it. All right now.

THE WITNESS: This is specifying that the system of Claim 24 we have means for processing the transaction before we allow any central -- well, we will have the means for processing the transaction in question before the central turns its attention to the next ticket-issuing machine.

THE COURT: Tell me what the need for that is. The mechanical rest time in a ticket window is so great in terms of the rest of the equipment that you have to make sure that that does not go on like a machine without a flywheel and forget about the opening transaction until it is all on latch, is that right?

THE WITNESS: Well, I think that is addressing itself to this: If you want to advance from the ticket machine onward but you do not want to do it until all of the necessary events for processing the transaction have occurred.

THE COURT: I see. So you want the last event in the chain of events to be the stepping of the system to look at the next ticket-issuing machine but not until you have done all you are supposed to

do to service the present transaction?

What you have in effect, starting with this scanning impulse, is that you have to make sure the complete circuit has been rounded and that all of the impulses employed are in focus either to accept or reject.

That may take only a fraction of a second but I guess the bet will only take a fraction of a second and then the devise scans on to the next window.

THE WITNESS: Yes.

THE COURT: That is what this is meant to assure?

THE WITNESS: Right.

THE COURT: In a way that seems to say the whole system.

THE WITNESS: Yes, as taking off from 24D, which says that we have "A sensing means for sensing for a selective entry transaction signal" if that has been energized because we press key 1 of that particular machine and for example --

THE COURT: It does not seem to be saying that D and E -- no D, D and E but not E before 25.

THE WITNESS: You are right. So according

to this then we have energized BMD and as we have also indicated on figure 2 --

THE COURT: That is Bet Made?

THE WITNESS: I did not want to persue that further. But the selector transaction signal is going to go through the entry register and we have described before, through the storage address generator as figure 15A shows with the heavy lines and on again into the aggregator address transmitter and further on figure 1B of Exhibit 15, into the registers, where it causes the right information to be brought forth to be updated by UAA and returned to MEMA and also causes the acknowledgement ACKA out of the acknowledgement Unit AKA so that AKA is going to the transaction processer A and within that we can see at the right of figure 2 on Exhibit 15, we can see that ACKA is going into control KA.

And therefore we look at figure 3 and we can see ACKA entering o45, which in turn turns on CONF, which in turn goes through D3 to produce CONA, which goes through O1 amongst other places.

We come to the top of figure 3 and it goes through the O1 to produce the step pulse but before the step pulse was produced we did indeed produce

the CONA signal which goes directly to the interface which in turn will produce the CON signal to send a confirm to the ticket machine acknowledgement signal response ~~of~~ means.

So we first produce that CONA that is going to result in the key release and ticket issuance before we went to step the scanning means.

(Cont'd on next page.)

1 THE COURT: Then one would have thought that D3 would have been located after the fourth rather than before it because things being what they are I would have supposed that CONA and the step signal would be simultaneous within reason.

THE WITNESS: You are saying those signals would be simultaneous within reason?

THE COURT: With the window at the same moment. If D3 is where it is, what does D3 do, it delays?

THE WITNESS: Yes, and I do not specifically recall at this moment why it is there but I do not think it is really to where we are now.

THE COURT: We are trying to get a priority of signals for the window.

THE WITNESS: Yes.

THE COURT: We are dealing with the simultaneity of original impulse.

THE WITNESS: Yes, except barring failures in equipment. Once we get out of where we are irretrievably committed to that confirmed signal it seems justifiable to let the ticket machine, to let the scanning means move on.

THE COURT: Oh, they can?

THE WITNESS: Pardon me?

THE COURT: They can move on?

THE WITNESS: In other words, we are already on the way irretrievably toward indicating that the confirmer is on the transaction at the ticket machine and is to be confirmed. Therefore it is reasonable to go on and start the process of trying to interrogate the next ticket machine.

THE COURT: And the same act would do both things, that is, release the window to go back in business?

THE WITNESS: Right.

THE COURT: So that it really does not matter whether they get there at the same time as long as the step does not get there first?

THE WITNESS: It does not get there without warrant, that is, without assurance that this is a transaction to be confirmed. In any event, the actual ticket issuance is going to take half to three-quarters of a second, anyway.

THE COURT: Meanwhile, much else will have happened.

Would this be a good point to stop?

MR. YUTER: I had thought I would ask one clarifying question.

Q Would you indicate the logical function of the

step pulse generator shown in Figure 3 and whether in fact there is some delay that occurs in that? I know it is not logically necessary but perhaps if you would explain it to the Court he will have a better grasp of what is in the step pulse generator.

A It is generating a pulse of pre-determined width.

THE COURT: Is what?

THE WITNESS: It is generating a pulse of pre-determined width, that is the width is determined by the electrical components inside it and the element it goes through to start the process off -- well, would be prime place that it goes to, for example, as to the scan counter in the right-hand side of Figure 2. And the nature of the elements inside that scan counter, there are flip-flops or like flip-flops and appropriately connected and their nature could well be that they will make a transition not at the beginning of this impulse but at the end of the impulse. So Mr. Yuter is referring to the fact the reaction inside the scan counter would then occur not at that very same time that you turned on the step or it got turned on, but rather when it got turned off.

THE COURT: Well, I guess the duration or extent

of the signal would be measured in frequencies.

THE WITNESS: It would be, you know, maybe a few microseconds. By today's standards it would be faster than that. Still, it would be delayed. That is the effect on the scan count, it would be delayed by the duration of the depulse, its step pulse.

Q So to polish it off, even though the confirmed signal CONA goes directly almostly to the TIM, there is some delay that occurs before the SCNN signal going into the ~~PIM~~ TIM terminates?

THE WITNESS: Yes.

MR. YUTER: I have to say, your Honor, that was a very interesting question before.

THE WITNESS: Does that take us to Claim 26?

MR. YUTER: I think it takes us to lunch.

THE COURT: Can we be back at 2:30, gentlemen.

(Whereupon, at 1:30 p.m. a luncheon recess was taken until 2:30 p.m.)

AFTERNOON SESSION (2:45 p.m.)

ROBERT L. WEIDA, having been previously sworn, resumed and testified further as follows:

DIRECT EXAMINATION

BY MR. YUTER (Continued):

Q Now, Mr. Weida, just before we step to Claim 26, would you just recapitulate the difference between Claim 24 and Claim 25 for the Court.

A I think that amounts to comparing 24(E) to 25 and saying that what the system should do is if there is a bet to be processed at a ticket machine being interrogated, then it has to be sure to go through all of the necessary steps and procedures to check the register and aggregate the bet and trigger the confirm mechanism before it moves on, and that is depicted by Claim 25, whereas if there is no activity at that ticket machine it ought as quickly as it can determine that and to step out right away to the next ticket issuing machine.

THE COURT: In other words whether there is no action or rejection or a bet, it should have an integrally systematized method of moving on?

THE WITNESS: Right, and Claim 25 covers the case of rejection or confirmation, although when we went through it we only specifically detailed confirmation, and 25(E) covers the third alternative of nothing

to either confirm or reject as though there was no activity whatsoever.

THE COURT: Yes. All right, let me mark that.

MR. YUTER: Plaintiff offers Exhibit 15 and 15-A in Evidence.

MR. ISNER: No objection.

THE COURT: Received.

THE CLERK: Plaintiff's Exhibit 15 and 15-A received in Evidence.

MR. YUTER: Would you please mark as Plaintiff's Exhibit 16 for Identification a drawing entitled, "Erroneous Data Checking EDP Sub-System Invention, Claim 26 and 27."

That is Sheet 1.

THE CLERK: Plaintiff's Exhibit 16 marked for Identification.

MR. YUTER: Would you also mark as Plaintiff's Exhibit 16-A, which is Sheet 2 of the "Erroneous Data Checking EDP Sub-System Invention."

THE CLERK: Plaintiff's Exhibit 16-A marked for Identification.

BY MR. YUTER:

Q Mr. Weida, I hand you Plaintiff's Exhibit 16 and 16-A for Identification and ask you to explain for the Court

how claims 26 and then 27 are applied to the patent disclosure.

A Claim 26 --

THE COURT: Which is 16 and which is 16-A

THE CLERK: Your Honor, this is 16 and this is 16-A (indicating).

THE COURT: All right.

A Claim 26:

"A system comprising:

"A) A ticket issuing machine which comprises" --

MR. ISNER: Excuse me, your Honor. I think this is the other one (indicating), this is 15. This was the mix-up before.

MR. YUTER: You are missing what?

MR. ISNER: 16-A, the real 16-A.

(Document handed to Mr. Isner.)

MR. ISNER: Thank you.

A Claim 26:

"A system comprising:

"A) A ticket issuing machine which comprises..."

So looking at Exhibit 16, 26(A), and flagging ticket machine N, we have part one:

"(1) A plurality of selectively actuatable and latching transaction-selection switches each associated with a

different entry for transmitting a selected entry transaction signal associated with the selected entry to an associated output sign."

And that is depicted by the balloon one under 26(A) pointing to selection switch 1, and depressing that switch we energize the associated output line M1N from ticket machine N to buffer 1A and buffer 1B, although I guess really what we are doing here is we are describing this as though the system were operating in a simplex with A, the master, in which case we can ignore the B side of the system.

Part 2:

"A rejection signal responsive means for unlatching any latched switches upon receipt of a rejection signal..."

There the 26A2 balloon is pointing inside the ticket machine N box to signify the presence of the rejection signal responsive means for restoring the key without issuing a ticket if the system found the transaction to be invalid.

Item 3 under 26(A):

"An acknowledgement signal responsive means for issuing a ticket having indicia recorded thereon which is related to a latched switch."

26A balloon 3 is pointing to the inside of the ticket machine N to signify the acknowledgement signal responsive means which will be triggered by the input signal CON to

circle the machine issuing a ticket for a winner, one, and then restore the previously latched key 1.

26(B): "Entry checking means for ch ecking for erroneous selected entry transaction signals and for transmitting a rejection signal to said ticket issuing machine when erroneous selected entry transaction signals are sent..."

Now, looking at Exhibit 16, we see again that in this case we are flagging both or comprehensively all of the buffer lines, and that we have emphasized that by darkening both input lines H1N and HNN from ticket machine N to buffers 1A and NA, so that we are considering at this point both or comprehensively all of the possible transactions, selected transaction signals, and that we are defining the buffers as part of the means described, the entry checking means, and their outputs are going to the transaction processor MRA, which also is flagged as being part of the 26(B) means.

Now inside that box it directs us to Figure 2 for further definition and specification of the means that make up 26(B).

Then we look at Figure 2 and the buffer signals, the buffer output signals H1A and HNA are going to the entry register and they are also flagging the fact that they are going to transaction made bloc.

Taking the output of the entry register first, its

outputs are flagged, are part of the means which are flagged, and the outputs in the entry register go to the two entry trans bloc, and this bloc is going to check the code of the system, the code used for the system at this point, and the code used is one out of N; in other words, if there are 12 runners, we know that of the 12 lines from the entry register to the two entry trans bloc exactly one should be energized if this is a valid transaction. So that the 2 entry trans, that bloc, will be some means of detecting whether the number of energized inputs is different than one.

Now, the text of the specifics of the patent indicates a couple of ways in which that might be done. If that were the case and if the number of energized lines from the entry register to the 2 entry trans bloc do not equal one, then we would get the THB output energized to go to control KA.

Now, looking into control --

(Continued on next page.)

THE COURT: Now, THB signifies what?

THE WITNESS: A two-horse bet.

That is really the overall specific in that it would be energized as if for example 3 or 4 were erroneously energized through some force in the system, so that signal is going to go into control KA and would be the reason for causing rejection.

But in any event, what we have flagged in 26(B) has been a checking means to determine that there ever existed, and 26(B) doesn't really -- pardon me, it does -- well, we go out of KA into KA with the 2HBI signal, which was the signal that detected that there was a serious situation, and that would cause KA to emit the REJA signal, which we have had several times before, and it is going to cause the ticket machine under interrogation to go through a rejection cycle instead of a confirmation cycle and clear the latched key.

THE COURT: Clear?

THE WITNESS: Yes.

And considering the other option or the other possibility, of two of the possibilities we want to cite here, the input -- well, the outputs from the buffers H1A, the signals, in other words, the signal

H1A and H2A also go over to the right on Figure 2, to the transaction made bloc, and as we have seen before, the output of that bloc is going to tell us whether there is data on the lines or not.

Now, what is going to happen here, or the error checking means referred to is the one in which after we have started to process the bet and have come throug all of the other error checks, we perform one final error check, namely one in which we purposely turn off or inhibit or block the interrogation signal from being emitted from the interface, and if we do that then the transaction selector signal which gave rise to all of this chain of events ought to disappear becau it has no interrogating signal going into the interroga tion switch so there should be nothing coming out.

If that were the case, in other words, in this last phase of the error checking process, if we turn off the interrogation signal, the signal line from the ticket machine to the buffer to the transaction made bloc, all of that should be de-energized, so BMD should be turned off and if it isn't, that would be the reason for signifying that an error exists.

So then I guess we can go on to 26(C):

"Means for transmitting acknowledgement signals

to said issuing machine when the selected entry transaction signal is correct."

We look at Figure 1B, we see that we are flagging the line out of the AADR line aggregating address and also the acknowledged signal ACAA, and we are kind of completing, taking a loop from AADR, the output of the transaction processor, all the way back to the ACK input for the transaction processor, and part of that path is kind of drawn around registers MENA and through updater UAA and acknowledgement unit AKA is to identify that although they are in the path of signal flow they are not the means to be employed here, so the path back via ACKA is the means for transmitting the acknowledgement signal toward the ticket issuing machine and the path AADR from the transaction processor MRA will be energized if and only if the selected entry transaction signal is correct, and if it is correct, then we will complete the rest of the path and send the ACKA signal back to MRA, from whence it will complete the rest of the journey and result in the issuance of a ticket at ticket machine N.

THE COURT: Now, what was that last?

THE WITNESS: That takes us to Claim 27 --

THE COURT: Just a minute. In the illustration

of Plaintiff's Exhibit 16 and with the tag line to balloon 26C, there the signal AADR, well, that is shown as it went around, that is, if it is a valid signal, really what happened is that is a short-cut for illustrational purposes.

THE WITNESS: Well, I wouldn't call it a short-cut, it is just a way of saying that we are not in that claim concerned really with what is going on inside.

THE COURT: I mean it doesn't mean that it goes around rather than through the stack.

THE WITNESS: It means -- In other words -- I agree, it is not intended to suggest that they really behave any differently than anywhere else but really it is that we wanted to de-emphasize the role.

THE COURT: To avoid specifying as a part of the reading of this claim?

THE WITNESS: Right.

THE COURT: And that is all.

THE WITNESS: Claim 27: "The system of Claim 26 wherein said entry checking means comprises means for sensing for the simultaneous presence of more than one selected entry transaction signal."

This is to specify, whereas Claim 26 was speaking

about error checking means in general, this speaks about a particular one of the two previously discussed in little less detail.

Again, the selected entry transaction signal, and let us say in this case that there is a fault in the system such that perhaps key 1 was depressed at ticket machine N but through a short circuit in the cable or for whatever other reason both lines H1N and HNN are energized so that the output of Buffer 1A and the output of buffer NA are both energized and we get therefore H1A and HNA on Figure 2 into the entry register and out of the entry register both go into the two entry trans bloc in the middle of Figure 2 and produce THBI, which signifies that that testor or check has failed, and that is transmitting to control KA to complete the necessary task.

Now, looking then at Figure 3 --

THE COURT: Just a minute.

THE WITNESS: Yes.

THE COURT: Yes.

(Continued on next page.)

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THE COURT: Yes.

THE WITNESS: Looking at Fig. 3 then, aside --

THE COURT: Looking to the --

THE WITNESS: Looking at Fig. 3, aside from the elements flag in Fig. 2, we have another chain of elements starting with A7 in the lower left-hand corner, THBI goes into A7 and that will be energized now because we have two out of N selected transaction signals energized, and at the proper time in the testing, TFT will turn on and allow THBI to energize the A7 output.

THE COURT: TFT is what?

THE WITNESS: Just a test signal in a chain of test signals that are generated on the right-hand side of Fig. 3, and each one gets generated to execute a particular task --

THE COURT: Is that on the right side?

THE WITNESS: Well, you see on the center right side of Fig. 3 there is a TFT output.

This is Fig. 3.

THE COURT: Yes?

THE WITNESS: And on the right side, almost in the center of the right sideof the figure, the TFB is on top and you go down from the TFB, and the

TFB is between the TFB on the top and the TFS further down.

THE COURT: Isn't it THB at the bottom, the THB at the bottom?

Well, all right.

THE WITNESS: So TFB was used earlier to test whether there was any activity present, and later a TFT test is used to sample whether there are too many inputs present, and the fact that the THBI is on at TFT TIM means that there are indeed too many inputs present and that the rejection action should be taken. So the output of A7 goes right through OR gate 3 and turns on --

THE COURT: Just a minute.

THE WITNESS: Yes.

(continued next page)

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THE COURT: Yes?

THE WITNESS: Turns on flip-flop, ERAF, to produce the ERA signal.

THE COURT: Wait a minute. What does the lettering in ERAF mean?

THE WITNESS: What does the -- what's that acronym mean? ERAF?

THE COURT: Yes.

THE WITNESS: ER for error, A for the A side of the system and F meaning that this is a flip-flop. In other words, ERAF --

THE COURT: A what?

THE WITNESS: Flip-flop.

ERAF is the name of that element or device and it's the convention of patent to underline the acronym if the acronym is -- refers to a device rather than a signal. But here --

THE COURT: If it's a device?

THE WITNESS: Device. You know, part of the mechanism rather than a signal or signal line.

So, as I say, the ER says error, the A says the A side and the F says it's a flip-flop device, producing the signal ERAF meaning the -- from that -- that signal says there is an error of some kind in

transaction processor A.

That then goes through OR-gate 04 and then turns on -- they reject flip-flop.

Goes to delay D4.

THE COURT: Wait.

THE WITNESS: Yes.

THE COURT: All right.

THE WITNESS: And comes out --

THE COURT: What?

THE WITNESS: Comes -- well, we got RHAF and then we got through D4 to produce the REJA signal and the REJA signal is this generalized --

THE COURT: Wait a minute.

THE WITNESS: Yes.

THE COURT: Yes? REJA activated and what issues from that?

THE WITNESS: Then that next goes to the delay element D4 and out of delay element D4 has REJA and REJA is the --

THE COURT: Just a minute. Yes?

THE WITNESS: REJA is the generalized reject signal, which says that we have a transaction to reject. It's made available to all of the interfaces but it will be utilized only by the interface

being interrogated right now, which in our example would be the Nth interface, which then would cause a rejection cycle at the Nth ticket machine, to restore the key or keys on that machine, and so that's the say per claim --

THE COURT: Just a minute. Yes?

THE WITNESS: So to recapitulate Claim 27 then the entry checking means described in 26 includes this means for seeing that somehow or other somewhere along the line two of the entry lines got energized and -- or more than one, in any event, and that causes a rejection.

So I guess that concludes Claim 27.

THE COURT: Now, on the boxes that we went through in Fig. 3, Plaintiff's Exhibit 16A on Claim 27, is the terminology the same as before? That A7 is an and?

THE WITNESS: Yes.

THE COURT: Block? And 03 is an or block?

THE WITNESS: Yes.

THE COURT: Now, are all those A and O references and/or or boxes?

THE WITNESS: Yes.

THE COURT: So that 04 is an -- an or box?

MR. YUTER: I don't know. It was Mr. Isner's deposition.

THE COURT: Were the originals and the exhibits filed, Mr. Isner?

MR. ISNER: I know the deposition was filed. My exhibit copies look like reproductions.

THE COURT: This is Joseph Lynch taken in April of this year?

MR. ISNER: Yes.

THE COURT: Let's proceed.

MR. YUTER: "By Mr. Yuter:

"Q Mr. Lynch, I am reading from Lynch deposition Exhibit 13, and hereinafter I will just use the exhibit numbers.

"A MM-hmm.

"Q That is, Exhibit 13. On page 22, which appears to be the President's Report at the Annual Stockholders' Meeting out at Roosevelt Raceway on April 18, 1961, was the president Mr. Alvin Weil?

"A He was.

"Q He states: 'We have been seeking some way to reduce the cost of our totalisator operation.' Would you explain, as far as your knowledge is concerned, about this concern for the cost of your totalisator operation.

"Lynch - deposition

"A Yes, well, for a number of years the cost was increasing, along with the handle that was based on the amount of business we did, and the figures ran, oh, hundreds of thousands of dollars. On a wild guess around that time it might have been $400,000, whatever it might have been."

THE COURT: The year?

MR. YUTER: Your Honor, I think he mentions that. Shall I read it again.

THE COURT: I will infer --

MR. ISNER: Isner.

MR. YUTER: "...whatever it might have been. And as the handle increased in later years, it became a more substantial figure. This, of course, was a big item of expense that the management would like to pare down if possible.

"Q About how long had Roosevelt been seeking to reduce the cost of its Totalisator equipment?

"A Well, to my knowledge, I had heard of efforts in this direction for several years before the period we're talking about. They had investigated possibilities of another Tote system, oh, back some years before 1958, I would think. I don't know the results of that, because I wasn't in on the discussion

electronic tote apparatus?

"A No, no, I don't.

"Q Do you recall the term 'Swedish tote'?

"A Yes.

"Q Could you briefly describe that?

"A Only by hearsay. I heard about Yonkers being interested with a Swedish company to put together a tote. I heard about it in that way; I never saw it. I know that their mutuel manager had been over there -- and this is again by hearsay. I heard that he went over to Sweden and they went quite a ways along the line; and at the TRA meeting that is described in the record here, Earl Kyser made a presentation and described the Swedish tote that they were working on and what it would do for them.

"Q TRA stands for?

"A Thoroughbred Racing Association.

"Q Were you present at that meeting?

"A I was there, yes.

"Q Do you know what the final result was, as far as the Swedish tote was concerned?

"A There -- it never happened. They didn't install that thing at all.

"Q Why was there an interest in building an

electronic tote?

"A As far as Roosevelt Raceway is concerned?

"Q Yes. From your own general knowledge as the paramutuel manager.

"A Because of the publicity in the newspapers at the time, at the time the electronic computer business was beginning to blossom, and great claims were being made for it, and the jobs that were actually being done, so it became of interest. And I was always concerned with the great amount of work that had to do in connection with the electromechanical equipment, which required a lot of mutuel summarization of tickets sold and it was a burden on the department to have to do that every race, and I felt that I would certainly like to hear about some equipment which would do it for us.

"I never asked anybody about it, but in my mind -- I said to American Tote's managing operator several times, you know, 'Maury, I wish you would get a different way to do this thing, and get rid of some of the paper work for us,' and he said, 'I'll see what we could do.' But it never came through."

done some work in the electronic computing --

"Answer: Only in conjunction with their installation of electromechanical equipment. I don't know whether they had tried to put together any electronic computers themselves at that time. But there again, they were trying to move along with the industry and give better service.

"Question: If I used the term 'all electronic tote,' would that be descriptive of the first Totalisator that was demonstrated in March 1963?

"Answer: Yes.

"Question: Was that the first all electronic tote?

"Answer: The first one I ever heard of, that was publicized at that time.

"Question: How long had the need existed for an all electronic tote?

"Answer: Well, we were able to live with the old equipment just by doing a little extra work. The 'need' for it, quote, is another way of putting it. We could have lived forever without it, but we would just have to keep on doing the work. We felt if we could improve our operation and do it quicker, cheaper, with less help, we wanted to do it.

"Question: How long did that need to do it quicker, cheaper, and with less help, how long did that need exist as far as your own personal experience is concerned?

"Answer: Right from the time I became mutuel manager, that's the way I felt about it. In 1954.

"Question: Mr. Weil, on page 3 of Exhibit 13, states:

"We have had to close minutes before the race in order to make the necessary computations in this complicated pool. With this, we would be able to bill until the very minute the horses go off.'

"Would you explain in greater detail what Mr. Weil was talking about.

"Answer: Yes. And it goes back to my feelings about the slow operation of the American Dte equipment, and this is a particular phase of it that was burdensome, because their daily double equipment did not give us any automatic aggregations. Every daily double machine in the plant had a sheet inside the machine about that big (indicating) -- that doesn't do you much good, does it?"

THE COURT: Was he saying each machine, meaning a TIM, I take it --

MR. YUTER: "Every daily double machine in the plant had a sheet inside the machine about that big (indicating) -- that doesn't do you much good, does it?

"Question: Why don't you describe the distance.

"Answer: A large sheet which was a ruled, printed sheet with spaces for the recording of every combination in the daily double, including the totals of all combinations in the double. As the selling on daily doubles progressed, the daily double tickets were issued, and at the same time a recording device in the machine, a printing wheel, would advance to show the number of tickets sold on that particular combination.

"Now, at the close of that, at the time we had closed betting, a takeoff, a roller would go down over those wheels with carbonized paper, that big paper I just described, and that way you would get a printout record of the sales in that particular machine."

THE COURT: He apparently is talking about some kind of device in which you had type letters and numbers on rotating wheels on a spindle which were inked, as each daily double combination was bet it would advance one or another or more than one wheel; then when the window was closed you could press a paper

down on the wheel and that would print just like an ordinary rubber stamp date printer or typewriter?

MR. YUTER: That is my understanding.

THE COURT: Yes.

MR. YUTER: "Now, we had 110 machines in various parts of the plant..." --

THE COURT: 110 of the daily double machines?

MR. YUTER: Apparently he means daily double machines.

THE COURT: I thought the 110 for all windows and 20 for daily double.

MR. ISNER: No. Actually, there are about 500 windows at Roosevelt, total.

THE COURT: And 20 percent are daily double?

MR. ISNER: Approximately. That is my impression.

MR. YUTER: "Now, we had 110 machines in various parts of the plant. Those printed had to be brought to a central room, near the calculating room, where a group of men would gather them all together to get the total money in the daily double pool and be read for a computation of the price.

Now, it took a couple of minutes just to get those things out of the machines and to the central room. And by the time we got them in and separated

them as to denomination and then made the addition, both manual addition and machine addition, in order to get the total pool, we needed several minutes to do this."

THE COURT: Just a minute, please.

MR. YUTER: "For this reason, we closed daily double selling at five minutes to post time."

THE COURT: That meant the post time of the first race, I guess?

MR. YUTER: Yes.

"For this reason, we closed daily double selling at five minutes to post time. Sometimes we would stretch it a bit if the crowd was big, down to four minutes, and make our job a little harder. Then, by the time the race starts, the machines are closed now, three or four or five minutes, and we are getting together the total pool. Now we know what the total pool is, and the horses are running.

"After the first race, we have the winner. Now we have to go through all of those sheets again to find out the number of sales, including the winner of the first race, with every horse in the second race. So there, what we did, we called it, 'hanging the wash,' which won't mean much in the record there. But it was

a matter of folding these sheets that we took out of the machines and hanging them on metal rods, so that we would have 10 to 15 sheets on a page, all folded to the winning number of the first race, and we could take the totals of each column that way, and have the total number of tickets sold involving the winner of the first race.

"Now, this was a long drawn out thing, when we only had about 15 minutes to do it in between races."

THE COURT: I thought it was a half hour before races, wasn't it that?

MR. YUTER: We got all those totals and then with the information already accumulated, getting the total pool, the calculation, taking the commission off, and dividing each total of each horse in the second race that included the winner of the first race into that net pool, so that we were able to get the payoffs that will take place on the daily double after the second race is run.

THE COURT: In other words, he had to get or did use the 15-minute period to divide the pool as it would be divided if any one of the entrants in the second race won in combination, of course, with the entrant in the first race, and from each of those take

off the different cuts for the state, the track, the owners, and God knows what else, Social Security for the horses, I suppose.

MR. YUTER: Of course.

"So that we were able to get the payoffs that will take place on the daily double after the second race is run."

THE COURT: That meant, really, getting the payoffs on every combination of the winner of the first race with an entrant in the second race, so that whichever one won you could immediately post a result.

MR. YUTER: "These payoffs are posted on the daily double -- Are you a man that goes to the track at all"

"Question: (Shakes head.)

"Answer: Well, those daily doubles were posted on the infield board, and we tried to get them out there on the infield board something like five minutes before the second race went off."

THE COURT: As a matter of purely historical or hysterical interest at this point, since you could not affect it, it was toc late to get on the daily double now.

MR. ISNER: It was just to publicize it.

THE COURT: Good for the nerves.

MR. YUTER: Good for business, I suppose, when you saw those big amounts.

"We were successful most of the time, but if we had differences in addition, computations, we had to search and correct it.

"But that was a real race, it was a tough job, and it was one of the worst parts of my job. I was always tickled to death when the daily double was over, because then, the rest of the evening's operation was automatic by comparison."

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THE COURT: I take it, when he says if differences developed, that they were in effect running parallel summtions as a check.

MR. YUTER: That's what I understand, if two men got different results then they had to find out where the error was.

THE COURT: One using the machine and the other an abacus, or something, or what?

MR. YUTER: I think he goes into more detail. I think there were three men doing computations, one with an adding machine.

MR. ISNER: If your Honor please, I think the real problem is that they have to get the totals for each of the combinations, then to match up with the --

THE COURT: In other words, you suggest that to a certain extent it would be self-checking, if it all came out to the same results.

MR. ISNER: That's right. There had to be so much in the pool and so much would go out after the deductions were made for the State, the track -- again, it is an accounting problem, as you will find out later on.

THE COURT: That would be simply to add the total in the first race, total wagered on the first

race through the daily double machine, which would already have been computed, to the total wagered on each horse in the second race, and to divide the total of the wagers on the first horse and each horse in the second race into the aggregate pool --

MR. ISNER: There is a total pool for daily doubles.

THE COURT: Into the aggregate pool, because the final odds are -- the amount of money wagered on the winner in the first, the winner in the second, divided -- there is no place and show there?

MR. ISNER: Actually, the problem here, as I understand it -- I could be wrong, because I am not an expert in this field -- there is a total amount of money in the daily double pool. It is not a question of the odds, that is all done before the first race -- as the money comes in the odds change. Now you are talking about payoffs which they post. At the end of the first race you know one of the winners. If there are eight horses in the second race, you have eight chances to win, depending on the odds. The total money in that pool less the handle that the State takes out, the track takes out, whatever it may be, must be distributed and what they were posting on

was the $22 for two or $47.50 for two for each of the horses in the race. This is the information that we are talking about.

THE COURT: That doesn't do any good because you had to tell people what the payoffs were per --

MR. ISNER: For each of the horses.

THE COURT: -- no, no, for each ticket, because you had $2.00, $5.00, $10.00, $50.00, $100 tickets.

MR. ISNER: You do it in terms of the $2 ticket, as I understand it. Everything beyond that is a multiple. The odds are the same whether you buy a $2 ticket or a $10 ticket.

THE COURT: But the payoff is different.

MR. ISNER: In the sense that the $10 will pay off five times as much, and this is where the totals of these pools have to come out.

THE COURT: All right.

MR. YUTER: "Q In the March 1963 demonstration, what, briefly, was the improvement in the daily double operation over what you just described?

"A In the March 1963 demonstration it was completely automatic. All of this information I have just described taken manually was available in seconds.

"Q And what did that mean in terms of money? What was the economic benefit of being able to do that

in seconds?

"A Well, to begin with, you were able to sell tickets right up to the time a race started. This is the most active betting period, the late minutes of betting, and if you have three or four minutes added to your selling capacity, that much more money goes into the operation. That's the number one benefit of it. And then, the operational thing, we were able to cut out some of the personnel that was necessary in this manual operation.

"Q Do you have any idea of what the percentage increase in daily double betting was as a result ofthe March '63 demonstration system?

"A Well, I don't have any figures on that. You know, when people get used to being able to buy tickets uphill the last minute --

"Mr. Isner: I would like to object on the grounds that the question assumes that actual betting was involved in the March 1963 demonstration. If the question is hypothetical I have no objection to it, because --

"Mr. Yuter: Let me just reword the question --

"BY MR. YUTER:

"Q -- and ask you the same question, but

as of this time that the fully electronic tote went on line,which was, I believe, 1964.

"A That's correct.

"Q As of 1964 with that extra five minutes of betting, can you characterize what the percentage increase of the handle was by virtue of being able to bet up to the moment the horses took off?

"A I would say a minimum of five percent, as just an estimation. Just as I was about to explain the habits of betting people: When they learn that those machines are going to be open four or five minutes longer, then they are very likely to delay getting up to buy their tickets. So this is a thing you can't put together -- you have to get at it.

"Q In terms of the day's handle, what does five percent mean?"

THE COURT: It sounds a little bit like lawyers and briefing deadlines, doesn't it?

MR. YUTER: Precisely.

"Q In terms of the day's handle, what does five percent mean?

"A You're talking about daily double?

"Q Yes.

"A If you would have a $2 million night, the

daily double pool might be $200,000. So if you increase that five percent, you've got a $10,000 increase in the pool."

THE COURT: In the pool?

MR. YUTER: In the daily double pool.

"Q You said that was the minimum benefit, five percent. Do you have a maximum figure that comes to mind?

"A There again, a guess. My estimate would be ten percent. Five to ten percent.

"Q In Exhibit 13, on page 24, Mr. Weil is quoted as having said:

'In the meantime, in order to assure continuance of service, we have a contract with the American Totalisator Corporation which has five years to run. During this period we expect we will be able to develop tests and prove this equipment...'

"What did you understand Mr. Weils to mean by 'develop tests and prove this equipment'?

"A Well, bring the ticket issuers into line. And that statement was made in 1961. It would be necessary to get the ticket issuers that were to be used in an installation, put them on line and simulate an actual operation as near as possible, which we did.

We had a lot of ticket issuers on line. We had men stay after racing several nights and go through a betting operation to test this equipment before we started using it in actual betting.

(Continued on next page.)

"Lynch"

were redoing it. That was only a temporary hiatus in their operation.

THE COURT: They lost a couple or three years.

MR. ISNER: Yes.

MR. YUTER: New York Racing Association comprises Aquaduct, Belmont and Saratoga. I believe the New York State arrangement with the flat races is only one of those three tracks operates at one time. I imagine they had a longer period at Aquaduct --

THE COURT: I don't think there is any question about that.

MR. YUTER: I also understand that Roosevelt Raceway runs at night during the same period that the flats are running in the daytime.

THE COURT: Worse than that, there is a bus you can take from Aquaduct to Roosevelt if you feel that you have not had enough with a day at the races.

MR. YUTER: "Question: What was the reaction of those who viewed the demonstration?

"A Great enthusiasm. It was a marvel to them to see the way this equipment printed out the necessary accounting information in a matter of seconds after the race was run.

"Lynch"

"Q In your own opinion, would you say that this demonstration was a demonstration of a breakthrough in parimutuel betting?

"A Yes, in the manner in which it was handled, I think it was."

THE COURT: Just a minute.

(Pause.)

MR. YUTER: "Q I saw a letter from a track characterizing the demonstration as revolutionary --

"Mr. Isner: I object, now. We are just throwing one adjective after another here. You had better be sure that the witness has the same meaning of revolutionary and breakthrough --

"Q Well, you used the term breakthrough. Would you explain that for Mr. Isner's benefit, please?

"Mr. Isner: What do you mean by it, Mr. Lynch?

"The Witness: What I mean by breakthrough in the business?

"Mr. Isner: Yes.

"A Well, the fact that we were able to show equipment that could do the job as quickly as

it did, and deliver the carbon copy that was so necessary to our operation."

THE COURT: Just a minute.

(Pause.)

THE COURT: Yes.

MR. YUTER: "Question: If someone used the term revolutionary, what would that mean to you and how would you apply it personally to the demonstration?

"A Well, I would consider that as an enthusiastic remark about the equipment, the fact that it did things so much better.

"Q In your opinion, was it revolutionary?

"Mr. Isner: The same objection.

"A I didn't use the word revolutionary in any of my statements. I thought it was great, and something I wanted more of. It was really the answer to my prayers."

Now, there was a discussion of the term rolling payoff, and I will skip on to page 87.

"Q Going back to the Amtote electromechanical equipment, how were the show and place odds calculated?

"A You mean the odds during the betting

6/1 BS:m

"Lynch

the track. I had occasion to go down to this supply room in the basement of the Roosevelt Raceway, and there was this old equipment there, prototype equipment.

THE COURT: Did he date that visit to the storage room and basement?

MR. YUTER: He talked about a complete installation at the track, so that would have to be after March '63, about '64.

MR. ISNER: Excuse me. The complete installation of the track was '64 and '65.

"A I don't know what shape it was in, but there it was.

"BY MR.YUTER:

"Q Was it ever returned to Digitronics?

"A I don't know.

"Q After the demonstrations of the prototype had been completed, what value did the equipment, prototype equipment have that was stored at Roosevelt?

"A I have no idea.

"Q What value did it have to you?

"A None at all. Because we had gone along, and the prototype was finished, and it was a piece of junk as far as I was concerned."

but I do question --

THE COURT: You can snip that off with a pair of scissors.

There might be scissors in the drawer.

Q Mr. Weida, were you present at or during part of this trial period of twenty-five racing days at the Roosevelt Raceway?

A As far as I can recall, I was present during all of that period.

Q Mr. Weida, as of your own personal knowledge, did the totalisator, Westbury's system, operate in a satisfactory manner?

A Yes. I would say that I became satisfied with it by the middle of that period.

Q Mr. Weida, by the middle of that period, do you mean --

THE COURT: Twelve and a half days. Between the fourth and fifth races on the 12th or 13th day.

THE WITNESS: I would say about May 1st.

Q As of May 1, 1964, were you satisfied that the Westbury system operated in a satisfactory manner and was ready to pass the test and satisfy the requirements of the New York State racing authorities?

A Yes.

THE COURT: I understand.

Q Mr. Weida, did we finish --

A I am not, --

Q I believe we finished.

But I think we broke off in the middle of something. Yes. You were in effect, making a more direct comparison between the reading of Plaintiff's Exhibit 11 and 11A, and that of Plaintiff's Exhibit 52.

THE WITNESS: I guess we are in the process of comparing 11 and 52. And I don't know that we finished with A or -- I don't recall whether we finished with A or not.

Q Well, I think you did. But just to play safe, perhaps you should start from the beginning, with 21A.

A All right.

THE COURT: I think we did 21A, B and C. I think we are getting up to the updating.

THE WITNESS: Okay. Twenty one D, then, on Exhibit 11, points to the runner total updater, which would be a segment of the program.

And in the case of the patent -- our patent, it's a specific head, one piece of hardware.

MR. ISNER: Can you speak up a little bit?

THE WITNESS: Okay.

21D concerns the means for updating the contents of said selected addressed aggregation registers.

In the patent, our patent, it's a piece of computer logic, and in the case of the NYRA system it's a piece of the computer logic program to fulfill the function of updating the old pool total and runner total to get the new pool and runner totals.

21E, means for returning said updated contents to said selected addressed aggregation register.

In our patent, there is means for taking the updater output, and it's wired to bid for access to the memory, and use the memory digit drivers and other memory circuitry, to return the updated numbers to the memory.

Similar hardware elements are part of these in the NYRA means for returning the updated numbers to the memory.

Similar hardware elements are part of the means in the NYRA means for returning the updated numbers. But included with those means are appropriate program steps in the programs to fulfill the same function.

21F, means for transmitting said acknowledgement

signal to the acknowledgement signal responsive means when said updated contents are returned to said selected address aggregation register.

Again, we have the technological unit transmitting information back toward the ticket machine in the case of Exhibit 11. And in the case of Exhibit 52, once the processes of updating the core memory are complete, then the program makes the decision to transmit an acknowledgement signal back toward the ticket machine to issue the ticket and clear the keys. And that segment of the computer program and the hardware employed in that case, are symbolized by the CON block in the larger computer block.

Q Then just to recap, would you then generally summarize whether or not each of the elements of the claim 21A through F, shown in the -- on PX 11 and 11A, has or has not its structural equivalent on PX 52.

A I think I described a reasonable equivalence.

(Continued on next page.)

Q Okay. Would you go to claim 22?

A Claim 22, the system of claim 23 comprising a ticket issuing machine memory, comprising a -- pardon me. I guess -- well, A, a plurality of addressed memory positions each storing the number of transaction made by a ticket issuing machine.

And 22A points to a block in the computer entitled TIN memory. We showed that in each computer. But we are only attaching the balloon to one to avoid cluttering the drawing. So the bottom area under core memory contains sufficient memory location to accommodate the information about the tickets sold at each ticket machine.

22B, address-selection means for receiving the signals generated by said generating means for selecting the particular memory position associated with the particular ticket issuing machine, the betting data is received by the computer and its memory. And on the basis of that data, the -- and on the basis of the suitable program usage of the computer hardware, the address selection means there including some programming and the hardware address selection components are enabled to select a memory location in core respondance with the betting data components of ticket machines.

22C, reading means for reading out the

contents of the selected memory position.

And there we are working to the exit point from the TIM memory out toward the TIM total updater, and indicating that this core memory has means for extracting the selected word from the core memory for further processing.

22E, returning means for returning the updated contents to the selected memory position.

Again, a combination of the appropriate program steps with the core memory hardware suffice to take the new total for that ticket machine and return it to the address position in the ticket machine memory.

Q Mr. Weida, would you now indicate what structural equivalents, if any, exist between the elements designated on PX-11 by the balloon 22A through 22E and by the corresponding balloons on Plaintiff's Exhibit 52.

A 22A points to -- on Exhibit 52, points to an area in the NYRA computer core memory to indicate a segment of that -- of that memory area and its core to the separate memory in our pattern denoted on Exhibit 11, Fig. 1B or element WM, which also includes a number of memory words or memory registers for storing ticket machine totals.

22B, dealing with address-selection means, is flagged upon Exhibit 52 by appointed to the ticket machine,

something called TIM Memory, which means that the general address selection components hardware, components of the memory together with suitable programming steps, are used to find the appropriate location in the TIM memory for this ticket machine.

Similarly, there is a 22B pointer to the ticket issuing machine memory on Exhibit 11 to signify the use of address selection circuitry that reacts to the generated signals from the transaction processor to find the corresponding ticket machine memory location that relates to the ticket machine spelled out by the signals from the transaction processor.

22C, contcerning reading means for reading out the contents of the selected memory position.

We are matching the means to read out the contents of the TIM memory area in the computer core memory with the means to read out the contents on Exhibit 11 of the ticket issuing machine memory.

22D, updating means for updating the readout contents.

On Exhibit 52, the block entitled TIM Total Updater signifies the program employment of the computer arithnetic and logic units to accept the old contents of the selected TIM memory position and incremented or updated.

Similarly, the updated UAW on Exhibit 11 fulfills the same function by use of the hardware.

22E, returning means for returning the updated contents to the selected memory position.

22E is pointing on Exhibit 52 to the entrance from the TIM total updated to the TIM memory area in the NYRA core memory.

On Exhibit 11, 22E is pointing again to the entry from the updated UAW to the ticket issuing machine memory. In both cases we are using the core memory facilities to return the new number into the same old address location. In the NYRA case, the hardware is supplemented by suitable program instructions.

(Continued next page)

Q To recap, Mr. Weida, would you state whether or not each of the balloon elements 20A through E on Plaintiff's Exhibit 11 has a structural equivalence on the same ballooned elements 22A through 22E on PX-53?

A Yes, I would.

MR. YUTER: Miss Hyman, would you please mark as Plaintiff's Exhibit's 53 --

THE CLERK: Mark this Plaintiff's Exhibit 53 for identification.

MR. YUTER: (Continuing) -- a block diagram bearing the title, NYRA Electronic Totalisator System.

THE COURT: Do you want to offer 52?

MR. YUTER: I was going to do that. Okay. Plaintiff offers Plaintiff's Exhibit 52.

MR. ISNER: No objection.

THE CLERK: Plaintiff's Exhibit --

MR. ISNER: I have no objection to its offer.

THE CLERK: Plaintiff's Exhibit 52 received in evidence.

MR. YUTER: Miss Hyman, would you please mark as Plaintiff's Exhibit 53 for identification a block diagram bearing the title, NYRA Electronic Totalisator System and bearing circled or ballooned designations 23A through 23E.

interfaced to computer A, and to computer B.

Looking at the strain of interconnected elements cited on PX-62 and again on 11 and 11-A, I would certainly say that the two sets of components are doing the same job in that in both cases we have a scanning mechanism stopped on a ticket machine and a selected entry transaction signal coming from the ticket machine and the output of the flag component, the assemblage of flag components in each case is to generate a signal.

In this case, a bundle of lines or a cable, which in both cases cahracterize the bet by defining the entry that you're betting on, as well as second group of lines defining the ticket machine, which is placing the bet. So that in that sense I would say that there is a -- except for insubstantial differences, one could replaceone set of components with the other.

I think that, as Mr. Yuter suggested, later on the next step we'll go into the extent to which individual components within these two assemblages of components are more or less structually equivalent to each other.

Going on to 20-C, we find on the -- that that concerns the components of the computer, several of the components of the computer on PX-62 and on Exhibit 11 we're concerned with several components of the transaction calculator.

That is to say, that on Exhibit 62, we flag the runner memory area or memory, the runner totals updater routine or sequence of programs steps in the computer program, and the COM component, which acts on favorable processing of the bet to send back a signal to produce a -- confirm ultimately that the right ticket issuing machine, and in the case of PX-11, we have the register's MEM, which accept the signal characteristic of the bet.

That is the source ticket machine and the runner or runners. And make that information available by memory operation. That is used, that bundle of lines which characterize the bet, to find the proper memory registers, make that available to the updater, UAA, also flag for 20-C, so that the updater can update the runner totals and return it to the proper memory register and then we have AKA, which has the function of remembering that the runner totals properly updated and passing that information back on to -- ultimately to cause a confirmation at a ticket machine.

So it's -- seems to me that in both cases we have an assemblage of components which be they programmed or wired or combination of both, which accepts information characteristic of the bet, including the runner numbers and the ticket machine number and the assemblages in the case of PX-11 and PX-62. Then if the transaction is correct, put

out a confirmation signal, a signal intended to cause confirmation ultimately at the ticket machine.

So I would say that the two structures of components cited on PX-11 and PX-62 for claim 20-C receive substantially the same input and produce substantially the same output. They're doing the same job and in a logical sense, they can substantially be interchanged with each other.

So I consider them to be structurally equivalent to those degrees.

IC fols.

(Continued on next page.)

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DIRECT EXAMINATION

BY MR. YUTER: (Cont.)

Q Mr. Weida, would you turn on PX-10 to Plaintiff's Exhibit 21 and indicate the relationship between the elements of Claim 21 and an exhibit I will now introduce -- no, sorry. And PX 62.

A Claim 21, the system of Claim 20, where it is said, "Transaction calculating means comprises:

"A. Register means having addressed aggregation registers for storing the aggregation of transactions."

Claim 21A is pointing to the runner memory, which contains a memory area wherethe current value of the bets on a -- each runner or runner combination in the race is kept.

Going on to"21B, means responsive to the signals generated by such generating means fo. selecting the addressed aggregation register."

So 21B on PX62 was pointing to runner memory and as we saw from the reference to Exhibit 50, the memory does have means to address and select particular areas in it under control of the program and under control of the nature of the betting data received for this bet, which is descriptive of the bet by designating such things as runners you're betting on and ticket machine from which

you're betting.

So that's the function fulfilled by the elements flagged 21B on Exhibit 62 for Claim 21B.

"21C means for reading out the contents of said selected addressed aggregation register."

The flag points to the runner memory and to the point of address from the runner memory over to the runner totals updater. And again, I believe the PX 50 did describe how there was a register which accepted -- whic held the information read out of memory from the appropriate place.

So Claim 21C in pointing to the output from the runner memory area indicates means for reading out the contents of said selected addressed aggregation register.

"21D, means for updating the contents of said selected addressed aggregation register."

The flag on PX62 points to the runner totals updater and that symbolizes the fact that when the proper previous aggregation from the proper register in the memory, runner memory area is made available to it, it will update it to correspond to the new total in -- to conform to the bet just being processed successfully.

So 21D is pointing to the runner totals updater to describe the function of PDP-8 system fulfills

in that area of updating a valid bet to updating the aggregation to take a count of a valid bet which has just been accepted.

"21E, means for returning said updated contents to said selected addressed aggregation register."

The 21E flag is pointing toward the entry into the runner memory component of the core memory area, and entry from the runner totals updater, and indicates the process of accepting the new aggregation and putting it back into the proper area of the runner memory, namely the area from which it -- that old aggregation total had just been extracted. That's certainly a capability of the PDP-8 memory.

"21F means for transmitting said acknowledged signal responsive means -- pardon me -- means for transmitting said acknowledgement signal to the acknowledgement signal responsive means when said updated contents are returned to said selected addressed aggregation register."

And 21E is pointing -- pardon me -- 21F is pointing to CON component of the computer to symbolize the fact that there are elements or components, pardon me, components in the computer program which recollect the determination by the program that the bet being

processed is valid and make the decision then to energize the proper IOT or input-output transfer line to tell the rest of the system, the scanner and the proper ticket machine that the bet had been accepted and that a ticket should be issued at the proper ticket machine.

(continued next page.)

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DIRECT EXAMINATION

BY MR. YUTER: (Cont.)

Q Mr. Weida, would you compare the structure shown on Plaintiff's Exhibit 11 designated by balloons 21A through F with the structure shown on Plaintiff's Exhibit 62 designated by those same balloons and indicate to what extent, if any, there is structural equivalence?

A 21A describing register means having addressed aggregation registers points to the runner memory area in PX62 and to registers MEMA in 21A and the runner memory area on PX 62 and the registers MEMA in 21A are certainly doing the job required by Claim 21A, in a logical sense I consider them interchangeable.

And to that extent structurally equivalent.

Claim 21B is again pointing to the same pair of blocks on Exhibit 62 and Exhibit 11 and here we are talking about the process of finding th old, now out-of-date aggregation in memory incorrespondence to the betting data from the ticket machine concerning this particular bet, and it seems clear that we are doing the same job in this case and that -- in a logical sense, the two structures referred to are interchangeable and again I will say to that degree the claim elements referred to on PX 62 and PX 11 for 21B are structurally equivalent.

Going on to Claim 21C, here we have the flag pointing in each case -- well, in the case of PX62, to the output point of the runner memory area and in the case of PX 11, to the output point of the register's MEMA area. Both -- in both systems, there are means for reading out, extracting from the -- each of the core memories the information selected.

So I would say we are -- in each -- in the case of PX 62 and PX 11, for Claim 21C, we are doing the same job and that again, except for insubstantial differences, the structures are equivalent.

Going on to 21D, the flags in each case -- flags in the case -- the flag in the case of PX 62 points to the runner totals updater, and in the case of PX 11 points to the updater UAA and in each system the function is that of taking the old aggregation and incrementing it in response to the new bet transaction.

In the Exhibit 11 case, it's a wired logic process. In the Exhibit 62 case, there is a computer program to make use of the computer hardware to achieve the same task. So we're clearly doing the same job and I'd say the block is conceivably interchangeable, one with the other.

21E, runner memory on PX 62 and registers

memory on PX 11, the claim element refers to process of returning first -- refers to means for returning the new aggregation to the proper memory location.

And in each case, that's a part of the system operation. Each system has the means to return the aggregation to the previously selected memory register.

So the same job is being done and the logical process of returning one to the -- returning the aggregation to the memory is -- seems to me logically equivalent also.

Claim 21F is pointing in the case of Exhibit 62 to the CON component of the computer and in the case of claim -- in the case of PX 11, is pointing to the path back from the AKA element in the transaction calculator, to the rest of the system and ultimately to the particular machine.

In both cases we have means for transmitting an acknowledgement signal. In the one case its acknowledgement signal is the IOT signal to the confirm gate and in the other case it's the ACKA signal to the transaction processor.

So we are doing the same task and logically it seems to me that the two things are carried out in the same way and are to that degree structurally equivalent.

(continued next page.)

Q Mr. Weida, would you turn now to claim 22 in PX10 and indicate the relationships, if any, between the elements of claim 22 and the structure on PX62.

A Claim 22, the system of claim 20 comprising a ticket-issuing machine memory comprising a plurality of addressed memory positions, each storing a number of transactions made by a ticket-issuing machine.

On PX62 the flag points to the TIM memory blocks or TIM memory component in the lower right-hand corner of PX62, and that is an area of the PDP8 memory which contains a count of transactions at each ticket-issuing machine -- a count which reflects the number of transactions at each ticket-issuing machine.

So that block in PX62 does perform the task required of claim 22A -- required by claim 22A.

Claim 22B, address selection means for receiving the signals generated by said generating means for selecting the particular memory position associated with the particular ticket-issuing machine.

Claim 22B also points to the TIM memory and the PDP8 system computer does use the betting data characteristic of the machine and runner from which the -- which the bet corresponds to to find the proper place in the ticket machine memory so that it can be selective and brought out for

further calculations.

Claim 22C, reading means for reading out the contents of the selected memory position. Claim 22C points to the points on the TIM memory component of the computer where the information read out is emitted to the totals updater, so that the TIM memory component does have in the PDP8 system means for extracting information from the TIM memory area of the core memory and making it available for further computation .

22D, updating means updating the readout contents, the TIM totals updater, which receives the information read out of the TIM memory area of the core memory and increments it in response to the current bet transaction so that that block can accommodate the claim element specified by 22D on PX10.

Claim 22E, returning means for returning the updated contents to the soft memory position. The flag 422E on PX62 points to the point on -- where the TIM totals updater transmits to the ticket machine memory and signifies the fact that the PDP-8 core memory has facility for accepting the updated total and returning it to the same memory location in the TIM memory area from which it extracted the information to be updated.

Q Mr. Weida, would you --

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THE COURT: Wait just a minute.

Okay.

Q Mr. Weida, with respect to each of the elements A through E of Claim 22, would you indicate the structural equivalents if any between those designated components on PX62 with the correspondingly designated components on PX11.

A For 22A we are comparing the facilities of the ticket issuing machine memory WM on PX11 with facilities of the TIM memory component of the core memory on PX62, and they are doing the same job, as indicated by claim element 22A, and they are both portions of core memory using the necessary core memory facilities.

One is solely hard wire, the other is programmed but they are doing the same task and are potentially interchangeable one with the other in a logical sense. So I consider them to that degree structurally equivalent.

22B, we are pointing to the facilities of the TIM memory area in the TIM memory of PX62 and the facilities of the ticket issuing machine memory WM on PX11, and in both cases, both components have the ability to select the proper memory locations in correspondence to the betting data made available from the -- from the scanner in the case of PX62 and from the transaction processor in the case of PX11.

So they are certainly doing the same task, and in a logical sense one is interchangeable with the other, and I consider them to be structurally equivalent in that sense.

22C, again the flag is pointing to the TIM memory on Exhibit 62 and the ticket issuing machine memory on Exhibit 11. And we are concerned with the claim element concerned with the means for extracting information from the selected memory position, so both components have the ability to extract data from the -- their respective memories, so they are doing the same job, and I think that logically they are substantially the same -- doing the same way, and I consider them to be therefore structurally equivalent to that degree and in that sense.

Claim 22D on Exhibit 62 is pointing to the TIM totals updater in computer D and is pointing to updater UAW in Exhibit 11, and in each case we have facilities for taking an old aggregation and updating it as required by the acceptance of a new transaction, so that we are doing the same job, and in a strongly substantial way I would say doing the same way, although in the Exhibit 62 case the devices are a computer which is programmed and in the other case it's a hardwire arithmetic process. But I consider them to be structurally equivalent to the degree indicated.

Claim 22E on Exhibit 62 is pointing to the entry of the new aggregation, newly aggregated, of number or word into the TIM memory area of the computer core memory, and on Exhibit 11 is pointing to the point of entry of the newly aggregated total for this kind of bet, and at this ticket machine into the ticket issuing memory, machine memory WM. So again we are doing the same job, and as to the core memory systems, we are doing it in a logically similar way. But one has the assist from the programming relevants part of the computer program, you might consider them as structurally equivalent to the degree described. And I guess that concludes 22.

Q Mr. Weida, on Plaintiff's Exhibit 62 should we make the corrections in the register A interface, computer A, register A interface, computer B that were made on PX61?

A Yes.

Q Would you do that, please, on the exhibit.

THE COURT: Is this a convenient place for a short recess?

MR. YUTER: Yes, sir.

(Recess had.)

THE COURT: We have some exhibits here.

MR. YUTER: Would you please mark as Plaintiff's Exhibit 64 for identification a block diagram bearing

equipment in the center in back of the desk; the desk has displays and controls and listing of outputs and along the left and right-hand sides you see simulated ticket issuing machines, and I catch a glimpse of a corner of a ticket machine at the left-hand edge.

MR. YUTER: Would you please mark as Plaintiff's Exhibit 102 for identification --

THE CLERK: So marked.

MR. YUTER: -- a photograph bearing on its rear the number 3763/3, and the stamp "Photograph by George E. Ernst."

THE COURT: Does he date it?

MR. YUTER: This one is not dated, your Honor, and it is apparently --

MR. ISNER: I raise no question. These pictures were all taken about June of 1961, as you will find out later on.

MR. YUTER: Plaintiff offers Plaintiff's Exhibit 102 for identification.

MR. ISNER: No objection.

THE COURT: May I see it?

THE CLERK: Now Plaintiff's Exhibit 102 in evidence.

(So marked.)

xxx

(Pause.)

Q Mr. Weida, I hand you a copy of Plaintiff's Exhibit 102 and ask you to tell us what it shows.

A This is a picture of the raised assembly on the desk of the demonstrator unit. And it shows five multi-digital displays which, as the caption indicates, horse, win, place, show, dollars bet, whether or not there are some units which in some cases indicate combinations, there are combination switch indicators.

Q Could you tell from your copy what is written on the switches at the extreme left under the designation horse?

A I cannot tell from this copy.

THE COURT: It says daily double in the right-hand one and regular betting in the left-hand one. It should, shouldn't it?

THE WITNESS: Yes.

MR. YUTER: Mr. Walsh, would you mark as Plaintiff's Exhibit 103 for identification --

THE CLERK: So marked.

MR. YUTER: -- a photograph of what appears to be a ticket issuing machine. On its back it bears the number 3583/1, and the stamp "Photograph by George E. Ernst."

Plaintiff offers Plaintiff's Exhibit 103 for identification.

THE COURT: About June of '61?

MR. ISNER: Yes. There was a whole bundle that we got in June. I have no objection.

THE CLERK: Now Plaintiff's Exhibit 103 in evidence.

(Pause.)

Q Mr. Weida, I hand you a copy of Plaintiff's Exhibit 103 in evidence.

Would you tell us what is depicted therein?

A This is a picture of the daily double version of the Holmann ticket machine, a patent for which we discussed a little while ago.

Q Can you make out the legend on the key in the upper bank at the extreme right?

A Well, I note it's supposed to be the clear key.

THE COURT: It says "clear" in this picture (indicating).

THE WITNESS: It's not as decipherable in this copy.

THE COURT: The next one is "test"?

THE WITNESS: Test, yes.

Q Mr. Weida, would you turn to sheet four of

Plaintiff's Exhibit 99 and indicate whether there is a corresponding key with the designation "clear" on it?

A There is a clear key at the right-hand side of the array of fourteen keys.

THE COURT: What figure was that?

THE WITNESS: Sheet four.

THE COURT: Sheet four of Figure 6?

THE WITNESS: Yes.

A (Cont'g) Fourteen keys, the right one is clear, next to test, next to runner keys, 1 to 12.

Q Mr. Weida, do you recall the function of a clear key?

A It is a key -- when of keys 1 to 12 were depressed, and the bet was not to be accepted, then there would be no response from the computer and it would be necessary for the seller to operate the clear key to restore the runner key which had been depressed.

THE COURT: It would pop up again?

THE WITNESS: Yes.

Q Mr. Weida, would you return to Plaintiff's Exhibit 102 and indicate the purpose of the button under the designation horse number at the extreme left?

A Well, I have a little bit of confusion about that; these buttons were either to indicate whether the

system was in the regular betting or daily double, or the means to switch from one to the other.

It may be that the actual switches were on the horizontal bet part of the controls.

What we see here at the left-hand end of Exhibit 102 either simply indicates what mode you put the system in by another manual control or the horizontal surface included the switch itself were doing that.

In any event, it is least concerned with signifying which manual parts had been made for betting or daily double.

Q What was the purpose of having two separate modes?

A The purpose was to share the equipment and minimize the cost instead of having equipment, two different ones, simultaneously available to provide the simulation of regular betting and daily double betting. You could show one thing at a time, the regular betting operation and then switch to a daily double, and show that simulated operation.

THE COURT: That is right in the middle of the day's work or racers' work.

THE WITNESS: Well, people would come in for a demonstration and I guess we would explain to them to conserve expense and all for this

demonstrator we are going to show them one thing at a time.

This was done one at a time to focus on regular betting and then changed the switch and plug board and indicated that you have to use the simular ticket machines in pairs for doubles operations and then go through the doubles operation.

Q Would you describ-e what you mean by the simulated ticket issuing machines referring to --

THE COURT: 101, I believe.

Q -- Plaintiff's Exhibit 101?

A On Plaintiff's Exhibit 101, we see on the right-hand side -- we see an array of eight of them and on the left-hand side we see about seven. In any event, there are eight on the left-hand side also.

There consists, as far as the demonstration is concerned -- I think they had eleven buttons, ten of the buttons were runners 1 to 10 and the eleventh I believe had the clear function that we picked up on the Holmann ticket machine and you depress one of the ten keys to place the bet, and if this were confirmed there would be a solenoid inside the ticket issuing machine to restore that depressed key and signify the central portion of the demonstrator had accepted the bet. While the key would be depressed, I believe

the indicator, which looks like a raised square, would be lit. If the bet were not accepted the runner key would stay down and the light would stay lit and you would have to clear that by operating the last button at the end.

Q If the bet were a proper bet, what would the outcome on the simulator ticket machine be?

A The depressed key would be restored and the light would go out.

Q Would a ticket be issued?

A No.

Q Why not?

A Because this is only -- it had no ticket printing mechanism. This was to get the numbers into the central demonstrator equipment. That would be the function, so something would be displayed and printed out.

MR. YUTER: Mr. Walsh, would you please mark as Plaintiff's Exhibit 104 for identification --

MR. WALSH: So marked.

MR. YUTER: -- a photograph bearing on its rear the number 3663-2 and the stamp "Photograph by George E. Ernst."

Plaintiff offers Plaintiff's Exhibit 104 for identification.

MR. ISNER: No objection.

specific recollection of -- and the logics and my understanding of what the system had to do, I did find that there was at least one deficiency in the computation of the probable odds which were displayed.

I don't -- at that point recall other specific deficiencies in the implementation.

In any event, I discussed and considered that deficiency and whatever others might have been evident at that time and planned things to overcome those deficiencies, to include them by the time we did turn the power on and we started off by turning the power supplies on and making the memory -- memories work as separate components and gradually making larger and larger pieces of the system work, going on up to making all of the bet acceptance work and making various facets of the display and listing facilities work, concentrating,as I recall it, on regular betting, and then switching to daily double betting, where of course the daily double betting shared a number of facilities with regular betting so that that was somewhat included in the daily double system test.

Q Do you recall when the 4726 first was able to aggregate a bet entered on a simulated TIM?

A I would have to answer that in terms of a range of time, with my confidence in the date being better as the

time period advanced, but it could have been, for regular betting, for example, sometime like mid or late November and for doubles, sometime like end of November or early to mid-December.

Q As I understand it, Mr. Weida, on Labor Day you took over the project and it took about two to three weeks to get the construction completed but that the system did not work when you first turned it full on.

Could you indicate what kinds of problems you had in getting the 4726 system to work?

A My recollection isn't too -- too rich. I know, for example, there were some bad diode components that had to be weeded out.

I know that somewhere in the course of this development, we found that we wanted to cause or to inhibit response by the central equipment.

If the bet were being placed at a window on an entry or entry combination that already had 99 tickets sold, because an additional transaction would have caused an overflow and instead of registering the 100th ticket transaction, it would have gone back to zero zero because that represented the capacity of the demonstrator memory.

I know some time was consumed in setting up

the 16 simulated ticket issuing machines on their counters and I seem to remember some noise problems or spurious signal problems concerned with the signals that go back and forth between the two simulated ticket issuing machines and the central equipment, but I don't remember any specifics of that.

I believe there were some problems with the third rack, which consisted of the relays that -- and their transistor drivers that drove the -- drove the displays and the lister itself. I don't think I can think of anything else at the moment.

Q When changes were made, were corresponding changes made on the drawings?

A Yes.

Q Could you briefly summerize the more fundamental changes in the logical design that -- if any, that you made in getting the logical design completed so that the system worked?

A Well, as I said, my recollection isn't rich in that direction. But the two that come to mind most specifically, are the question of improper probable odds display, which in fact we did not fix in an ideal way but in an approximation that was deemed adequate for the purposes of the demonstrator and its demonstration function.

And the other one I remember most clearly is the inhibition of an attempt to sell a 100th ticket at a window on a particular entry or entry combination.

Q Do you recall that -- do you recall the date the 4726 was first demonstrated to non-Digitronics personnel?

A I'd have to put that in this rather broad range from mid-November to mid-December or possibly early '61. I'm not-- can't be more specific about that.

(continued next page.)

Rose flws.

Digitronics executives or Roosevelt or Westbury executives, so I don't take that to be public.

Q Can you recall any demonstrations where the ticket issuing machines were disclosed in operation with the demonstrator to non-Digitronics personnel?

THE COURT: To non-what?

MR. YUTER: To non-Digitronics personnel.

A I know that there was occasion to plug in the ticket machine to the demonstrator and to make it operate with the central equipment, but I can't say as to whether that was ever done for a demonstration or not.

Q Would you describe how the simulated ticket issuing machines were scanned and how data was entered into the memory of the 4726?

A Well, not having the drawings to look at, not having looked at them since that time, I don't have a clear detailed recollection, but I do remember some aspects of it, which I think are supported by the Hohmann schematic.

Q Is that schematic --

A The one on the patient I guess would suffice.

Q By the patent, you are referring to --

THE COURT: Hohmann patent.

Q -- Plaintiff's Exhibit 99 and Figs. 25 and 26?

A A couple of points I was going to make are

there is no bidline coming out of the drawing of Feg. 25 and there is no intergate or scan-like input to energize the read-out keys.

If we look at the upper lefthand corner of Feg. 25, we see in code Drum 1 and code Drum 2.

Q Code drum 1 and code Drum 2 and they would be means for getting read-out out of the ticket machine and they were fed by minus six volts through a series of relay contacts, so it is correct to say that there was no inter-gate signal from the central to energize the read-out mechanism and that the individual wires, data wires, on the horse number were brought to the Rack 1, 4726, and a particular bundle for a particular ticket machine or simulator would be gated by some signal corresponding to that ticket machine or ticket machine simulator, to let the rest of the system know that this is the machine we are dealing with at the time.

THE COURT: This is the machine that is what?

THE WITNESS: In other words, instead of sending out an intergate to the ticket machine and observing the -- in that way getting response from the machine to which the intergate was transmitted, Rack 1 would being in all of those lines and would have logic in itself to energize the data lines from each ticket

machine -- pardon me -- to gate in the data line from each ticket machine in turn.

BY MR. YUTER:

Q How were the -- by ticket machine, you mean the simulated ticket issuing machines?

A Either the simulated ticket issuing machines or any ticket machine that was plugged in to 4726. That is to say, I'm saying what I have said about the Hohmann ticket machine also applies to the simulated ticket issuing machines.

Q Can you state whether or not both the daily double Hohmann machine and the regular betting Hohmann machines could be used simultaneiously in the system to enter bets?

A I don't believe they could be used in any meaningful way, because one of them was -- one of the two have to be incompatible with the operation that your set up to do, either regular betting or daily double betting, and you couldn't get a ticket that would reasonably correspond to -- if you were set up for regular betting, and you plugged in a daily double machine, it would be incongruous to try to make sense out of what you got.

Q How were the SIMS -- the simulated ticket issuing machines, how were they scanned?

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THE COURT: How could you do that if you had up to twelve runners?

THE WITNESS: Well, this uses a two out of five code.

THE COURT: Again, a two out of five binary code?

THE WITNESS: Yes. In other words, again, for security purposes of the five possible leads characteristic of the given runner, exactly two would be energized by this conductor and non-conductor pattern, and the sensor would know that that validity will have to be obeyed, or the bet should be rejected.

Q Mr. Weida, if there was a rejection, to what extent, if any, was it communicated to the simulated ticket-issuing machine or to the Hohmann machine if it was plugged in?

A Well, the 4726 Unit did not communicate any rejection signal to the ticket machine. That was the function clear key that we discussed earlier, namely, the clear key was a means by which the seller could restore the machine and try another bet.

You asked me about the scanning process, and, as I said, I know that when you make a selection at a simulated ticket-issuing machine, or a real one, you provide a batch of leads that are run back to the -- let's say, five leads for a

we began to have conversations, including Jack Knoll and Ed Richards. And Jack Knoll was first closely associated with the development of the memory modules that are evident looking at Fig. 1D. And Ed Richards, his primary concern was the detailed design of the computers in which he was assisted by Mr. Knoll. And at one point or another, perhaps at about that time or early '61, I believe Miss Berrizen moved on to another assignment, either in marketing or product development. And at that point the over-all system design coordination fell to Mr. Richards.

I would say the computer memory design then would have been substantially done in early '61, followed by the computer design, and then at various points throughout 1961, various pieces of peripheral equipment were designed, some peculiar to racetrack operations and some not.

For example, the console and paper tape input-output system and a printer output flexowriter input-output, and so forth.

So construction design was continuing in 1961 and construction was building up until in the latter part of 1961 we were testing components of the over-all system.

Finally, I believe in December of '61, the equipment was moved to Roosevelt in preparation for a late

Weida-direct

winter or early spring demonstration. All during this time the programming of the computer had been under way. And we started to use it as a system in the track environment in early '62. By February, '62, we were using the system with 20 ticket machines approximately to accept bets and computer payoffs and probable odds and pool totals, win, place, show, daily double, and developed window printouts, display payoffs and pool totals on the infield board and small displays inside the area in Roosevelt Raceway where the equipment was set up.

It was set up so that you could walk to the window and view the infield board and turn around and view the 20 ticket issuing machines as the central equipment.

Q Was this just prior to the demonstration in March of '63? I just wonder if we lost a year there someplace.

A Yes. I got a bit confused.

THE COURT: I think most of what you said was -- What you said in '61 should have been '62.

THE WITNESS: That's correct.

THE COURT: That's what I thought.

THE WITNESS: Peripheral design was going on in early '62, and computer design was going on -- and construction started in the spring or summer of

'62, in various parellel paths, and most of the construction was completed toward the end of the year. Then the end of '62 the equipment was moved to Roosevelt. And by early '63 we were using it in a racetrack environment, with 20 ticket machines, with the full infield display, with local displays in the room. And that did just precede the March 6, 7, 8 demonstration -- March 6, 7, 8, 1963 demonstration at Roosevelt.

Q Who was the project -- did that project have a number?

A The number was 4784.

Q Who was the project leader?

A I was the project leader.

Q To what extent did the logical design of the demonstrator help in defining the 4784 Westbury Tote?

A Well, of course, I knew the design of the demonstrator. But I don't recall a conscious effort to, you know, look at those -- I don't believe I did look at those drawings or hark back to it. And I would say that in several significant ways it did differ from the 4726 demonstrater equipment.

Q Would you indicate the principal ways that differed from the 4726 demonstrator.

Weida-direct

A Well, the demonstrator was altogether hard wired --

THE COURT: What?

THE WITNESS: Hard wired program equipment. It was restricted to a capacity of 16 machines. It could not do daily double and regular betting simultaneously. It did not issue interrogate signals to the ticket machines. The ticket machines did not receive a reject signal. They had to be cleared by the use of the extra key.

The large system had a full complement of -- well, a fairly comprehensive complement of input or output equipment whereas the demonstrator only had the lister and the little room-sized displays and the 16 simulated ticket issuing machines.

THE COURT: Could you read back that last clause to me?

(Record read.)

Q After the decision was made by Westbury Electronics Corp. on August 15, 1961 to authorize Digitronics to go ahead with the -- with what turned out to be the Westbury Tote, what was the status of the demonstrator? Where was it located and to what extent was it useful?

A For a while it stayed where it had been in

solenoid which relieved the latch-key, didn't it?

A Yes.

Q I believe you said that when you took over the demonstrator project from Mr. Kielsohn, I believe was the name you used, that you received some logic diagrams.

Was that what you called it?

A In taking over any project of that sort, logic diagrams and schematic diagrams and so forth would be available to the person taking over.

They would exist with the project and be available.

Q Now, I am not interested in what normally would be available, did you actually receive any diagrams that you have a memory of, or are you deducing it?

A I remember.

Q You remember?

A Yes.

Q What quantity of diagrams were there?

A Well, talking about the logic?

Q Whatever you were talking about in your testimony.

A Well, I think in my testimony perhaps I focused on the text writeup of the logic I got from Mr. Schower.

9

Q A text write-up of the logic?

A Yes.

Q Could you describe that?

A I would say it was perhaps between 15 and 20 pages of typed material describing the operation of the logic of the demonstrator.

Q What else? Did you receive any other material at that time?

I am talking about written or drawings or things like that.

A Well, the word received, feels a little uncomfortable, but given responsibility for the project, I would immediately seek out and have access to a batch of drawings that related to that job including the logic drawings.

Q What was the batch of drawings other than the logic drawings? Is this different from the write-up?

A Yes.

Q Describe what was available for your perusal and what you looked at at that time?

A Well, I know we do have available a list of the drawings for that unit that would be a more accurate delineation at this point than my recollection if you want to --

Q I am interested in your recollection of what you referred to at the time that you took over this project?

A I would guess about 20 logic drawings were my first immediate concern in conjunction with this text description of the write-up that I got from Mr. Schower.

Q Was the text description of the write-up that you got from Mr. Schower exhibit 94B that we looked at for-- well, we'd better be sure on that.

(Pause.)

Q 94A, the simulator.

A It was not.

Q It was not?

A No.

Q Was there any --

THE COURT: Just a minute.

(Pause.)

MR. ISNER: It's exhibit 94A, your Honor.

THE COURT: I just wanted to make sure I had it in the right pile.

Q You were not referring to that?

A I was not referring to that.

Q Did you also see --

THE COURT: Wait a minute. I want to take a look at that.

A I guess on the basis of my background and the vocabulary that I am used to.

Q When you see the word data processor then, that has a meaning to you of what?

A I tend to think of electronic digital computers.

Q Why?

A Well, because I've worked at it for 25 years.

Q All right.

Because of your personal work in the field?

A Other people may have the same reaction. That may be -- however, my experience may be part of my reaction.

Q All right.

Let's come back. Now, data processing systems are really quite old, aren't they?

A Well, you go back to Charles Babbage and the previous century.

Q Right. Let's go back to IBM. You used that name a few minutes ago. IBM has had data processors for long prior to any date herein of concern; is that correct?

A Yes.

Q All right.

As a matter of fact, back in the 1930's, they used the so-called punch card units; is that correct?

A They had punch card equipment earlier than that.

Q But --

THE COURT: What?

THE WITNESS: They had punch card equipment earlier than the 1930's.

Q Right.

THE COURT: What was the first set, hollerith?

THE WITNESS: Yes.

MR. ISNER: Called hollerith cards.

THE COURT: Yes.

Q But certainly during the 1930's, IBM data processors employing punch cards were common, were they not?

A Let me respond that during the 1930's IBM had punch card equipment.

Q All right.

And they were -- those -- that equipment you are talking about used binary numbers as the base, didn't they?

A Punch card equipment?

Q Sure.

A Well, I think I would not want to characterize them that way. I think that they used the punch card which was not -- not what I take to be the specific binary code.

For example, in a vertical column on the card, you would punch one hole for a numeric and you punch a pattern of holes for some character or other. I think that's not to my mind some characteristic of the binary number system.

Q And you also could punch on those cards binary numbers, couldn't you?

A I think that was primarily done with the advent of the high-speed electronic digital computers that you would punch cards in the binary code.

Q Are you saying that the IBM punch card systems back in the days before the -- what you characterize as high-speed electronic did not use binary number systems?

A Not by my definition.

THE COURT: What was that?

THE WITNESS: Not by my definition.

(continued next page)

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CROSS-EXAMINATION

BY MR. ISNER: (Cont'd.)

Q Okay. Are you saying then that they were not digital type data processers?

A I would say that they were digital type data processers.

THE COURT: That what?

THE WITNESS: That the punch card equipment was a species of digital equipment.

THE COURT: As distinguished from analog?

THE WITNESS: Yes.

Q Now, these early data processers, let's keep in the same area -- employed logic circuits, didn't they?

A Would you tie down a little bit --

Q They employed And circuits, what you have been talking here?

A Would you tie down a little further which equipment you are speaking of?

Q We are talking about the IBM data processers, we'll say in the late thirties.

THE COURT: Late?

MR. ISNER: 1930's, your Honor

A Really, to be honest about it, I am not intimately acquainted with those oieces of equipment.

Q In such electro -- let me ask you this. Were you aware of a computer called the Mark II that was up at Harvard? In the early forties or late forties?

A I'm aware of it.

Q All right. And would you say that was a digital type data processer?

A Yes.

Q And would you --

THE COURT: Let's see. That's the Harvard Mark II?

MR. ISNER: Two.

THE COURT: Of the forties?

MR. ISNER: Let's say the late 1940's, your Honor.

THE COURT: Post war?

MR. ISNER: Post war. I think it started during the war but for our purpose we can take it as a post war.

BY MR. ISNER:

Q What was the last question?

THE COURT: And your question was. Would you regard that as?

Q A digital type processer?

A Yes.

Q And that was an electro-mechanical unit, wasn't it?

A I believe so.

Q Using relay switch circuits? Largely?

A I believe so.

Q And that unit included a number of logic circuits, employing relay switching elements?

A I think you're talking about something that I am not really that thoroughly familiar with in detail.

Q Okay. But certainly there were digital data processers using relay switching circuitry as the component elements? In, we'll say as of the late forties? Early fifties?

A Sir, will you repeat the question?

(Read)

A Yes.

Q And they employed binary number techniques in their operation, didn't they?

A Oh, I think we'd have to be speaking about a specific one that I would have specific knowledge about before I would go as far as to say that. For example, the INIAC is an example of one that did not use binary but I believe used a decimal format.

Q How about this Harvard unit?

THE COURT: The which?

Q How about the Mark II at Harvard? Do you know which ones that used?

A I really don't.

Q Okay. In such electro-mechanical digital data processors, you could use the presence or absence of a voltage as a signal, couldn't you?

THE COURT: No. This is in the EM?

MR. ISNER: Electro-mechanical, yes.

A I guess so.

THE COURT: Could you read me the question, please?

(Read)

Q You know what it was, don't you?

A Well, I think in any piece of equipment anywhere, for one reason or another one could use the presence or absence of a voltage for anything, for something.

Q Certainly. You could use voltage polarity as a signal, can you not?

A The polarity of the voltage may represent information in the system.

Q Right. And the magnitude of the voltage level can represent something in a system, can't it?

A The magnitude of the voltage --

Q I used magnitude of voltage level as synonymous in that question, that can be a signal in such type system, can it not?

A I would say that in any electrical system the magnitude of the voltage is characteristic of the signal. That certainly is also true of analog systems. I'm not sure what he -- okay.

Q We're --

THE COURT: Can I hear the magnitude voltage question, particularly the end of it?

(Read)

Q And the current level can also be used --

THE COURT: Meaning intensity?

Q Magnitude, the number of amperes or milliamperes flowing in a line can also represent a condition or a signal, can it not? In such systems?

A Yes.

Q And the condition of a switch, whether it's open or closed, can be representative of a state of conditions or a signal in such systems, can it not?

A Well, I don't want to quibble but I don't think the state of the switch represents the signal.

Q You don't? Okay. Are you saying it can't be indicative of a signal?

A The opening --

THE COURT: Now you changed.

MR. ISNER: I'm taking his chance.

THE COURT: You changed terminology because it can be a sign but is it a signal?

MR. ISNER: I'm asking him. It's indicative of the state of a condition. Is that true?

A Well, opening or closing a switch in a circuit will affect the status of signals in the circuit.

Q Fine. All right. Now, that Mark II unit that was at Harvard, was a stored program data processor, was it not?

A I don't think I know that well enough to say one way or the other.

Q Okay.

THE COURT: Didn't that have a lot of publicity at the time?

MR. ISNER: I suspect so.

Q Now, weren't electronic elements such as diodes and the like aslo used in electro-mechanical switching circuitry?

THE COURT: Could I hear that one?

(Read)

A Well, they might also, -- in their use in

such a situation, have functions other than logic functions. They might be used as power supplies or to damp transients or things of that sort.

Q They also serve -- they also functioned as parts of logic elements too, didn't they?

A Well, I'm sure that there would be a twilight region or a zone when people making somwhat less use of mechanical and trying to use more of the solid state components so there may be som examples of equipment such as you have described.

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(Continued on next page.)

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Q Now, in the post war period, say the late 40's, early 50's, we saw the increasing use of electronic components in data processing, didn't we?

A That seems like a reasonable statement.

Q Initially they were vacuum type units, diodes, triodes, and what have you?

A Yes.

Q Now, they was still digital, weren't they?

A Electronic computers of the digital type existed at that time, yes.

Q And they used binary numbering systems, didn't they, for the handling of data?

A The electronic digital computers of this period did offer or usually use binary numbers.

Q And they used the same basic logic approach, didn't they?

A As what?

Q As the previous electromechanical data processors?

A I wouldn't agree that it would be fair to make that characterization.

Q Well, you could have an and circuit made up of relays, couldn't you?

A Yes.

Q And you could have an or circuit made up of relays, could you?

A Yes.

Q And these electromechanical data processors had and and or circuits by the hundreds in them, didn't they?

A I certainly do not think that would make typical electromechanical computers equivalent to digital --

Q I didn't say anything about equivalency, Mr. Weida. We are just trying to get some facts out here and not conclusions.

The same basic logic element, and circuits, or circuits, inverters, were used in the electronic digital data processors as were used in the earlier electromechanical data digital processors, were they not?

A Well, I would certainly regard as a fundamental part of the logic of the configuration of these modern electronic digital computers the memory facilities, and that is what I would regard as a prime component to logic configuration.

Q I do not think that question had anything to do with memories. That is completely different subject matter. Let's keep it back to the question I asked.

A Well, I think I was trying to answer that among the logical facilities of the high speed electronic digital

computers would have to be included memory configurations.

Q But the point is that they still use the same basic logical elements, and circuits, or circuits, inverters, as were used in the previous electromechanical data processors? Is that not true?

A Both kinds of systems included, among other things, those kinds of elements in different technical forms.

Q Now, the earlier electronic data processors were usually of the hard wire variety, were they not?

A Would you be more specific about which ones you are speaking about or how you characterize them?

Q I am talking about the ones which were originally developed for military use.

THE COURT: Those are electronic.

MR. ISNER: Yes, electronic.

A Well, what period of time are we speaking about?

Q Let's take the late 1940s.

A Well, I am not clear that you are correct on that. I do not know that much about the military technology of that time.

Q When did solid state circuitry and circuit elements become available at reasonable cost for inclusion in data processors?

A I would say that started in the late or latter

50s.

THE COURT: Latter 1950?

THE WITNESS: Latter or late 1950s.

THE COURT: When was the first of the semi-conductors? '54 was it?

THE WITNESS: Excuse me?

THE COURT: When was the semi-conductors? '54 or something?

THE WITNESS: I believe the transistor was invented in about 1948.

Q But it didn't come on the market as a commercial practicality at reasonable cost until the late 50's, isn't that correct?

A I understand so.

Q The same with crystal diodes and these other solid state components? Is that generally true?

A Well, the crystal diodes were available -- well, were used in the so-called tube computers, for example the Edvac, the Ciac and the Swak, and so forth, made substantial use of semi-conductor diodes.

Q When did these ferrite core memory units become available at reasonable cost for use in data processors?

A Well, I guess a reasonable cost is a hard thing to deal with. I would say about the mid-50s perhaps.

Q I beg your pardon?

A I would say something like in the mid-50s.

THE COURT: There are we talking about things such as the hand we have here?

MR. ISNER: Yes, sir.

THE COURT: With the tiny little circuit shown in the form of a hand.

MR. ISNER: Yes.

THE COURT: I forget the exhibit number. It is one of the early exhibits.

MR. ISNER: 12, perhaps.

Q In what period of time do you locate we will say the commercial utilization availability of the integrated circuits and the -- well, let's leave it at an integrated circuit.

A Oh, maybe the mid '60s or a little later, something like that. Again varying with when they were used for military sophisticated purposes, and somewhat later for widespread commercial use.

THE COURT: By that you mean the modules?

MR. ISNER: Well, little integrated circuits. The thing has gotten smaller and smaller.

THE COURT: Printed circuits and miniaturization.

THE WITNESS: Many transistors in one tiny case.

THE COURT: With their circuitry permanently in place.

THE WITNESS: Yes.

Q Now, electronic circuit elements, for example, consisting of the vacuum type have always posed questions of reliability in any sort of data processing units, haven't they?

A There were certainly less reliable than solid state components.

Q But even solid state components pose a question of reliability, don't they?

A Anything physical does.

Q And in data processes of that type describing your patent there are thousands and thousands of these solid state components, aren't there?

A Yes.

Q Each of which poses some question of reliability?

A Everything poses questions of reliability.

Q But you have multiplied the number of components to a tremendous amount, haven't you?

A Relative to what?

Q Well, relative to whatever you want to compare it to. There are thousands and thousands of the solid state components in the unit, aren't there?

A There are thousands of solid state components in these units.

Q And it was recognized rather early that in order to achieve reliability with electronic components you had to, if you want to call it that, use redundant circuitry, redundant components, in order to provide back-up for reliability purposes? Isn't that true?

A Well, possibly it was not practical to do the same thing without the electronic components, and since these things were new and people would have -- or were willing to consider that extra consolation.

Q Well, isn't the use of the dual computers in your patent disclosure and the elaborate cross-checking systems that you described to accommodate this, if you want to call it, an inherent lack of reliability in the electronic components?

A Well, I would rather say it was an attempt to enhance reliability.

Q But still it was to accommodate the possibility of breakdown of those components, wasn't it?

A If you were sure there was not going to be any breakdown, there wouldn't be any point in having dual units.

MR. ISNER: That's right.

Q Let's turn to the next paragraph of your

specification starting at line 14, column 1.

Now, it states there: "...one of the most common of these systems --" Let me start again:

"...one of the most common of these systems is a parimutuel system employed for servicing transactions or wagers made by spectators at sporting events..."

Now, I take it from that, Mr. Weida, that the handling of parimutuel bets was and is a recognized type of data processing system, is that not true?

A Well, parimutuel systems process data so in that sense --

THE COURT: I beg your pardon?

A (Continuing) Parimutuel systems process data so from that statement I would agree that you have to take the literal interpretation that they are data processors.

Q And in the parimutuel operation, the data sources, that is, the place where the data comes from, is the TIMS?

A Yes.

Q And in a parimutuel system we have a set of processing components to operate in some way on that data, do you not?

A You have to handle bets, yes.

Q You also have something between the data sources

and the processor to get the information back and forth? Is that not true?

A Yes.

Q That was true in the electromechanical units as well as it was in the units described in your patent?

A Yes.

(Continued on next page.)

Q Well, is it fair to state that most --

MR. ISNER: Strike that.

Q Is it fair to say that there are a great number of different types of data processing systems which take data from one set of sources, have a processing unit and a communications link in between, and get the data in and out of the processor from the sources?

A Yes.

Q Such as space reservation systems for example?

A Yes.

Q Can you give us some other examples of systems of this type?

A A pocket calculator?

Q I beg your pardon?

A A pocket calculator.

MR. ISNER: Fine.

Q How about the system for the stock exchange where orders would come in to a central location?

A That is processing data also.

Q Did you have any connection at Digitronics with the unit that they made for the Shearing Drug Company?

A No.

Q That was a system of the same type also where there were a plurality of data sources and a processing

element and communication links between?

A I believe so.

Q In fact in almost every data processor there must be some input devices; there must be a processing unit; there must be some communication links between? Isn't that true?

A Yes.

Q Okay. Let's continue on with the spec about line 16. It starts column 1:

"...Presently available systems are slow operating..."

And it continues on by saying:

"...have only average reliability. Depend upon considerably human assistance and have limited versatility..."

Did you ever make a bet at a racetrack, Mr. Weida?

A I believe I have.

Q How do you make the bet at a racetrack?

A You tell the seller what you want.

Q Let me suggest that the first step is you get on line in front of a betting window. Is that true?

A Escuse me. Would you repeat your first question? I mean the one before.

THE COURT: How do you make a bet at a public racetrack.

A All right.

Q That is the address that you are talking about when you say in your patent, which is the identification of these two coordinates, is it not?

A Yes.

THE COURT: That gives you the stack.

MR. ISNER: It gives you access to or identifies -- I'm not sure what the proper word is -- that particular stack or line of cores that represents one word of memory.

Q Is that essentially right, Mr. Weida?

A Yes, it defines one word of core memory.

Q Now, this address function was also old and conventional at the time you filed the application, was it not?

A Yes. If you had a core memory assembly you had to be able to address and locate it.

Q For any core memory of this type

THE COURT: Would have a --

MR. ISNER: Do you mean the witness' answer? You had better read the question and answer.

(Record read.)

Q And that was true no matter what type of a data processor the core memory was used in?

A I'm a little confused as to what you are getting at with that question.

Q I am just saying no matter what the environment of the use of the core memory, in order to get access to one of these words you had to have a two-element address?

A Yes, indeed.

THE COURT: Is this a safe and convenient place to break for lunch?

MR. ISNER: Well, one more question. One or two more.

Q And in core memory at this time, in order to get information out of the core memory, operate upon it --

MR. ISNER: Strike the question.

Q The procedure for getting information out of the core memory so that it could be operated upon and read back in was also old and conventional, was it not?

THE WITNESS: Would you repeat that question, please.

(Record read.)

A Reading out of core memories was a standard part of the application of the core memory components.

THE COURT: May I have the last part of that answer?

(Record read.)

Q It was also well known that you could perform some operation of the information that was read out of that core memory and put the new or changed information back into the core memory; correct?

A I agree the only reason for taking it out was to do something with it and put it back.

Q That again did not depend upon the particular environment in which the core memory was used?

A To use the core memory you had to take information out of it.

Q Update it and read it back in?

A Yes.

Q Now, once a decision had been made to use your core memory in this paramutuel computer all of the requirements for getting the information in and out were more or less set, weren't they?

THE COURT: May I have that question back, Mr. Simon?

(Record read.)

A Well, I would say that the circuits to drive the addressing lines, and the sense amplifiers, and the digit line drivers did not differ subst antially from -- as used for this core memory -- did not differ substantially from such components used with other core memories.

when it would be operated in this room. And perhaps we could be more specific or a little more confident if we look at a picture of the Hohmann machine, but that does look to me like it is a piece of a structure characteristic of the Hohmann machine.

Q As I understand it, you had one Hohmann machine for daily double and one for regular betting, is that right?

A Yes.

Q Both installed in that room?

A May have been in the same room at the same time, I don't recall.

Q O.K. At least you used one for daily double and one for regular betting to affect ticket issuance in the course of these demonstrations?

A I don't recall having used those machines at demonstrations.

Q Well, they were hooked up, were they not?

A Well, we had the 16 simulated machines there and you could unplug the simulated ticket issuing machine and plug in a ticket machine, depending on your desire at the moment.

Q You could plug in one of the Hohmann machines for daily double and the other one in on regular betting, right?

A Well, the operation of the one machine would nc be used out of its mode of betting so I wouldn't think we have both plugged in at the same time.

Q Are you reasoning that or are you saying you didn't use them at the same time even though they might have been plugged in?

A I think that we -- my recollection is we used the ends of the ticket machine numbers for the machine like -- in other words, we used position 16 for the regular betting issuing machine and position 15 and 16 for the doubles betting machine.

Q That is the Hohmann double betting machine you are talking about?

A Yes.

Q Where did you put the Hohmann single or regular betting machine?

A My recollection is that when we wanted to use the Hohmann regular machine we would plug that into position 16. That is that corresponding to the SIM which is issuing machine 16.

Q You plug the double issuing machine into where?

A Position 15 and 16.

THE COURT: Did you say SIM?

THE WITNESS: Using SIM, S-I-M for Simulating

"What was the nature of this project that you took over at this time?"

And your answer was: "It included about 16 simulated ticket issuing machines and eventually included a few real ticket machines."

Do you recall that testimony?

MR. YUTER: Excuse me.

MR. ISNER: That's on page 20, Mr. Yuter. I'm sorry.

MR. YUTER: Okay.

A Sounds familiar.

Q All right.

Were there any real ticket issuing machines other than the two Hohmann machines that you had hooked up with this unit?

A Eventually, I believe that Mr. Lease's Western Tote Machine was tried out in the system.

Q Okay.

A I think eventually an Australian J-8 ticket machine may have been tried out in this system.

Q Now, in the operation of this unit, after you depressed the key on whatever item you were using as a ticket issuing machine, if the bet was accepted, was the data stored as an increment in the core memory?

No. 12 would be $10.00 bet?

A The plug board would determine the pool and denomination assignment.

Q Right. Once the bet was accepted, an acknowledgement signal would be returned to that particular TIM, would it not?

A Yes.

Q And upon receipt of that acknowledgement signal, the latch key would be released if it was one of the simulated TIMs?

A Yes.

Q And if it was one of the units that actually issued a ticket -- issued a ticket, it would affect the cycling of the printing mechanism and the issuance of a ticket, in addition to releasing the key, correct?

A Yes.

Q Now, if a bet was placed on one of the machines -- ticket issuing machines, on a horse that had been scratched, and you pulled out from the plug board the wire, whatever it is as you said before, that represented that horse, what would happen?

A That window would be passed over, as I recall it, so that relative to that transaction, nothing would happen.

Q Right.

And then there was a provision for clearing or releasing that latched key by pressing down a "Clear" key which would actuate the release solenoid, would it not?

THE COURT: Would actuate --?

MR. ISNER: The latching solenoid to release the key.

Q Is that essentially true?

A You could press a "Clear" key and that would restore the ticket machine to its initial "Clear" position.

THE COURT: And put it back in service, as it were?

THE WITNESS: Yes.

THE COURT: Or readiness for service?

THE WITNESS: Yes.

MR. YUTER: Mr. Isner, I assume the references to the ticket-issuing machines were references to the simulated machines.

MR. ISNER: No.

Whatever was hooked up to it at that time. As I understand it, it could have been a simulated machine or could have been issuing a ticket.

THE WITNESS: Which time are we speaking of?

Q Whatever you have been testifying about. You

said you hooked them up.

THE COURT: We are all going to be sadly in trouble if this isn't 1961 and the demonstrator.

Isn't that what we are talking about?

MR. ISNER: That is right. Sometime during the year 1961, as far as I'm concerned.

THE WITNESS: Well, in fact, some of the non-digitronic ticket machines were -- well, at least one that I could think of was plugged in and tried out and -- in the latter part of '62.

BY MR. ISNER:

Q But certainly some of those --

THE COURT: Is that the Western one?

THE WITNESS: One I -- particularly have in mine would be the ATLJ-8.

Q The automatic tote unit?

A Yes.

Q But the other ones you were referring to were hooked up and operated before March of '62, weren't they?

A I wouldn't want to be so precise about the date as that.

Q You can't say they were put in only after March of '62, can you?

A Which ticket issuing machine are you referring

to?

Q You testified which ones they were, Mr. Weida.

A Which --

Q I believe you put in a Western Tote unit and you also put in a Bell Punch unit and hooked them up in addition to the Hohmann machines.

There were three different machines you said were hooked up with this unit?

A Well, I think the -- we have a -- I have seen in, you know, presented for evidence, I believe a letter from Mr. Lease which described, sometime in late May he was going to send us, late May of '61, he was going to send us a ticket machine.

Q That certainly was installed and operated before March of '62, wasn't it?

A Yes.

Q All right.

Now, as I understand it, this demonstrator unit was an electronic unit and included solid state components, didn't it?

A Yes.

Q And it was an electronic data processor, was it not?

A Yes.

CROSS-EXAMINATION

BY MR. ISNER (Cont'd):

Q Let me ask you again, Mr. Weida, did you know of any Mr. MacMillan that was with Digitronics Corporation other than the draftsman you identified yesterday?

A After that testimony, I did discuss that with Mr. Yuter and he reminded me of a Mr. Ed MacMillan, in addition to the Mr. Ray MacMillan whom I remembered.

Q What was Mr. Ed MacMillan's job at the time you were there?

A He was involved in marketing. I think in particular in O.E.M. sales and I do believe that at one point he was involved with the link between Roosevelt and Digitronics.

Q Okay.

As I understand your testimony, the demonstrator unit during the course of the year 1961, included 16 of the simulated ticket issuing machines that are shown on the photographs and on occasion actual ticket issuing machines whether of the Hohmann type or of the Western Tote type or of the Bell punch type; is that a correct statement of your testimony?

A At times a ticket machine was plugged into the demonstrator and in any event, it had 16 positions, which

would be filled up with simulated ticket issuing machines.

Q Right.

As so constituted, this demonstrator included a plurality of ticket issuing machines, didn't it?

A Well, I don't know that it did necessarily.

Q I said as so constituted, 16 simulators and on occasion machines that would actually issue a ticket, within that context, they included a plurality of ticket issuing machines?

A Well, if one was plugged in, that wouldn't be a plurality.

Q All right.

Then it had at least one ticket issuing machine at those times?

A On occasion, one ticket issuing machine was plugged in.

Q Did each of those ticket issuing machines, whether they're simulators or the type that actually issued a ticket, include a plurality of selectively actuated switches?

A Yes.

THE COURT: Just a minute.

MR. ISNER: I beg your pardin.

THE COURT: Yes, sir.

MR. ISNER: I lost my place, your Honor.

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THE COURT: I think you're in Coaim 20(a).

MR. ISNER: Yes, I am, your Honor.

BY MR. ISNER:

Q All right. And those switches or the keys that depressed the switches were capable of being latched in the depressed condition, weren't they?

A Yes.

Q And they were transactions selections switches, weren't they?

A Yes.

Q All right. And each one of those switches was associated with a different entry in a race? May have been an imaginative race with the demonstrator, but it was a contemplated or imaginative race, wasn't it?

A Yes.

Q And when you depressed those switches, they actually created a transaction signal associated with whatever switch you pushed down, isn't that true?

A Yes.

Q And that signal would either be accpeted or rejected by the other components in the machine -- in the unit?

A Well, I guess as we've discussed before, there was no rejection.

Q What?

A I say, there was no positive rejection.

Q No, it just --

A Absence of activity.

Q Just didn't accept the data?

A Right.

Q Then the key, the depressed latch key wouldn't be ppopped back up again?

A That's correct.

Q Right. Which in effect was a rejection of that data, wasn't it?

A Well, non-acceptance.

Q All right. Non-acceptance.

And didn't each of those ticket issuing machines also -- well, didn't the ticket issuing machines, the actual units hooked up include a signal responsive means for effecting the issuance of ticket upon a receipt of an acknowledgement signal coming back from the processor?

A The -- if you plugged the ticket issuing machine in, you'd plug in one that would have a means to confirm the ticket and print it and issue it.

Q Right. That would be in response to an acknowledgement or a confirm signal coming back from the processor; right?

A Right.

Q Right. And in the simulated ticket issuing machines, the return of that confirm signal would cause a release of the latched key; right?

A That's correct.

Q All right. And there wouldn't be any ticket issued because there was no ticket printing or issuing mechanism in the simulators; right?

A That's correct.

Q Now, within the demonstrator unit, and after the key was depressed, was another signal generated that was representative of the entry associated with the particular ticket issuing machine in which the key was depressed?

A Would you repeat the question, please?

MR. ISNER: Better read it. I don't think I could --

THE COURT: It's 20 (b).

MR. ISNER: Yes.

THE WITNESS: Oh.

MR. ISNER: Let me ask you this. Maybe we'll shortcut it.

THE COURT: I think what he really is asking without having the demonstrator here, would you say that you could read Claim 20 on your mental model of the demonstrator?

THE WITNESS: Yes.

BY MR. ISNER:

Q All right. So other than the caveat you had as to plurality before, Elements 20(a), 20(b) and 20(c) in their entirety are readible on the demonstrator; correct?

A I believe so.

Q Now, how about Claim 21? Isn't every element of Claim 21 also readible on the demonstrator?

MR. YUTER: Mr. Isner, I assume by 21, you just mean elements 21 (a) through (f)? You don't mean to include the dependency?

MR. ISNER: Excuse me. You lost me.

THE COURT: You don't mean -- it's dependent on 20.

MR. YUTER: Right. Only talking about the additional elements.

As I understand the question --

MR. ISNER: I'm not trying to trick him.

THE COURT: Except for plurality point, he agrees on Claim 20 and we have to have that in mind all the time.

MR. ISNER: Yes. Accepted.

THE COURT: That subject to that.

In other words, did it united with 20 register

means, responsive means, readout means, updating means, redeposit means and means for sending the A.K.A. back to the key?

THE WITNESS: Well, there is a -- a question here in that the aggregation registers of the patent refer to aggregation not by ticket machine but by information type and --

THE COURT: I'm sorry?

THE WITNESS: The aggegation registers of the patent referred to an aggregation by category of ticket and are not -- don't break down to an individual ticket machine.

The demonstrator did not feature that kind of aggregation. It only had with the window aggregation.

BY MR. ISNER:

Q All right. But -- didn't the demonstrator include register means, having addressed aggregation registers for storing the aggregations of transactions?

A Well, it seems to me what the demonstrator had was the -- it had a different kind of aggregation than I take the aggregation registers of Claim 21 to be, namely, an aggregation over a type or combination of denomination and pool.

THE COURT: Without a TIM aggregate?

THE WITNESS: Right.

In other words, the demonstrator only had the TIM memory, it did not have the other aggregation, which the patent had.

BY MR. ISNER:

Q All right. But this claim doesn't make any distinction in that sense? It says register means having addressed aggregation registers for storing the aggregations of transactions.

In the breadth of that language, don't you find that same element in the demonstrator?

THE COURT: Leave out the word "breadth" within that language.

Q That language, don;t you find the same elements in the demonstrator?

THE COURT: Not the same, but is there in the demonstrator that which responds to the language register means having addressed aggregation registers for storing the aggregations of transactions?

I think you have to disassociate the claim language from the instrument on which you happen to know it is drawn.

THE WITNESS: You mean, you shouldn't look at the specification?

THE COURT: Not at this point.

Mr. Yuter will tell us about that later.

MR. ISNER: That's right.

THE COURT: You see, because I think one reason for that is that there is no indication that the claim was allowed only because restricted to the precise disclosure of the preferred means shown in the patent.

There wasn't any argument about that -- allowing Claim 21 in that respect.

MR. YUTER: You're quire right, your Honor. But I think the word transactions is defined in Claim 20.

Maybe that's where the problem arises.

THE COURT: Yes.

MR. ISNER: All right.

THE WITNESS: That that understanding -then, I don't see any major difference.

BY MR. ISNER:

Q All right. And the same would apply for sections of Claim 21 labelled B, C, D, E and F; correct?

A YEs.

Q All right.

Now, let's turn to Claim 22.

I believe you have said before that Claim 22

read on the demonstrator as well, did it not?

A Yes.

MR. ISNER: Your Honor, I think I'm just about through and I'd like to have a recess for about five minutes to see if there are one or two points that I might have overlooked, and I think we are about done.

THE COURT: Okay.

If there is anything you have overlooked, let me know.

I'm sure Mr. Weida will thank you.

(Recess taken.)

B fols.

(Continued on next page.)

shown in the photograph?

A Yes. The machine shows our twelve push buttons which are the keys to operate the one for each runner and a total, or a test, rather.

It also shows 13 counters, which are used to record the number of tickets sold on each individual runner and also the -- in the same row, a total counter which accumulates the total sales for that particular race.

It also shows --

THE COURT: Where's that?

THE WITNESS: That is to the extreme right of the counter. There are twelve and then the 13th one.

THE COURT: Number 13 gives the total --

THE WITNESS: Total sales for that race. Forward of that we can see a portion of the --

THE COURT: Could I stop you for a moment?

Would that give the total number of transactions or the total value of the transactions?

THE WITNESS: Total number of transactions.

THE COURT: For that race?

THE WITNESS: For that race, right.

These are resettable.

THE COURT: What's that?

MR. ISNER: Will your Honor desire to have Mr. Fosse go through this again rather briefly in the sequence of operations, referring to the components, to have it in one place?

THE COURT: I would think it might be a good idea.

BY MR. ISNER:

Q Mr. Fosse, do you want to briefly run through the sequence again, referring to the elements on the drawing?

A When the seller operates the runner one key, it closes the runner one contact.

Also, the operation of the runner one key closes the contact assembly designated ONS.

At the extreme end of the depression of the key the contacts CB are closed.

Closing of the CB contact, now we get a ground from-- rather, the negative from BLO through the winding of relay S1 through the winding of relay TR through the CB contacts, through 1 and 2 of the off and on contacts to ground.

This operates the TR relay and the S1 relay.

Q Can completion of that circuit, the action taking place, can that be considered as a bid signal?

A Yes, it could.

Q Please proceed.

A The operation of the S1 relay causes contacts 4 and 5 and 2 and 3 of that relay to be closed, and we now, with the collector starts which closed, we have ground from the collector starts switch through springs 1 and 2 of the total bet relay, through 4 and 5 of the S1, to 1 and 2 of R2 through 1 and 2 of R1, through 14, 15 of CN, through 14-15 of C2, through 14-15 of C1, through contacts 2 and 3 of S1, to the --

(continued on next page.)

S:jk
rAM R2

THE COURT: Wait a minute.

A Through 2 and 3 of the S1 to the coil of C1 relay. The operation of the C1 relay closes its associated contacts and if we close contacts 10 and 11 we have a latching circuit through 12 and 13 of C2, through 12 and 13 of CN, through 5 and 6 of R1 to ground. This causes C1 to be latched.

Q In an energized condition?

A In an energized condition.

Q Right?

A Closing the contacts 4 and 5 of C1, we now have an electrical path from ground at the total bet relay, through its 150 ohm winding, through its 30 ohm winding, following vertically downward through springs 3 and 4 of R1, through springs 3 and 4 of CN, through springs 3 and 4 of C2, through springs 4 and 5 of C1, vertically up to the 1.4 winding of the acknowledgment relay, through the acknowledgment relay spring 2 and 3, which are normally closed, through the 1.4 winding of the SMR, through the 1.4 winding of the SMR, through the 1 and 2 contact of the TR relay, which is now energized; through the switch on the R1 key assembly, through the fuse, through the 1 and 2 contacts with the BC relay, which is being held normally operative, through the winding of the runner bet relay or RBR1 to negative 50 volts.

This causes the operation of the -- this passes

a current of approximately 270 mils in this circuit, which causes the operation of runner bet relay 1 and the total bet relay. The operation of the total bet relay opens contacts 1 and 2, removing the ground from the collector start switch from C1 coil. But C1 coil remains latched through its own 10 and 11 to 5 and 6 of R1.

The operation of the bet relay closes also springs 3 and 4 and passes ground through the winding of the slave coil to negative 50, operating the slave relay; the slave relay in turn closing its contacts at 1 and 2, passes ground to the motor magnet of the switch, the coil of the switch, energizing the switch; simultaneously in the runner adding machine, the operation of the runner bet relay closes its 1 and 2, passing ground to the slave relay which becomes energized and the closing of contacts 1 and 2 of the slave relay passes ground through the winding of the motor magnet or coil of the switch, energizing the switch.

Q Now, in very broad terms, is what you have just described the action of the collector in completing the betting circuit through the TIM into the runner and adding machine, into the totals adding machine after a bid signal has been raised in one of the S relays?

A That is correct.

Q We now have --

A We now have the motor magnets -- both the total and the runner, we have the runner bet relay, the slave and the switch energized in the runner, and we have the total bet relay, the slave and the switch energized in the total.

Q Right. Now what happens. We now -- from the closed contacts 3 and 4 of the slave of the runner, we have ground fed through 3 and 4 of the slave through 3 and 4 of the switch, following the acknowledgment bus, across the bottom of the page back up to spring 1 of the total adding machine stepper switch to a point halfway in the total bet relay shutting out the 150 ohm non-inductive winding. This increases the current in the betting circuit to approximately 1.3 amperes, causing the SMR and the ACK relays to operate. The operation of the SMR relay closes its own 1 and 2 contacts, causing the start magnet to operate.

The operation of the acknowledgment relay closes its own 4 and 5 contact latching the acknowledgment relay to ground through 3 and 4 of the off normals, and subsequently opens its own 2 and 3 contacts, opening up the betting circuit causing the bet relays in the runner and total to be restored; restoring the bet -- respective bet relays, also restores the slaves and the switch motor magnets, causing the switches in each to increment one step.

The restoring of the collector start through

springs 1 and 2 of the bet relay causes ground to be passed through springs 6 and 7 of C1 relay down through 1 and 2 of R2 through 1 and 2 of R1 through 14-15 of CN, through 14-15 of C2, through 8 and 9 of C1, through 1 and 2 -- through 2 and 3, I apologize, 2 and 3 of S-2, wait a minute, let's see -- 1 and 2 of S2, which is normally closed; through 1 and 2 of SN, to the coil of R1, resetting -- operating R1, which in turn operates R2.

The operation of R1 releases the previously latched C1 and the operation of R2 removes the latching ground from R1 causing R1 to restore.

The restoring of R1 causes a ground through 5 and 6 of R1, through 12 and 13 of CN, through 12 and 13 of C2, through 12 and 13 of C1, back to springs 6 and 7 of R2 to energize the opposing winding causing R2 to restore.

This completes the cycle.

Q Now, is my understanding correct that the acknowledgment relay and the SMR relay are energized into activity by the increase in the current from, I think you said, 270 miliamperes to 1.3 amps.

A That's correct.

Q But the current that is extant at the time the information is being fed into the runner adding machine and the totals adding machine is 270 miliamps.

A That's correct.

Q Is there any accommodation in the system which you have been describing, which I understand is essentially the system that was in Aqueduct in 1960 or '61, or preventing a bet from being processed on a horse that has been scratched?

A Yes.

(continued next page)

DIRECT EXAMINATION

BY MR. ISNER: (Cont.)

Q Will you explain how that is done?

A When a horse is scratched, we operate the horse lock switch which is at the extreme left of the drawing.

We have --

Q Is that the unit marked HLK1?

A That's correct.

Q What is that supposed to be, scratch on horse No. 1?

A This would indicate horse 1 is scratched. The operation of this causes the BC relay to restore to normal opening its own 1 and 2 contacts.

Q Does that mean that that automatically opens the betting circuit?

A Yes, it does.

Q And prevents the information from being incremented?

A That's correct.

Q In the runner adding machine and the totals adding machine?

A That's correct.

Q All right. Under such conditions --

THE COURT: Wait a minute.

THE COURT: Wait a minute.

MR. ISNER: Excuse me.

THE COURT: Yes?

BY MR. ISNER:

Q I understand now that the runner key for runner on 1 is still latched. Does that get released in the case of a scratched horse?

A Yes, it does.

Q Will you explain how that is effected?

A We have -- as before, when the runner 1 is energized, we close the off normal contacts, CD contacts, operating the TR and the S1 relay, which causes the collector start ground to operate to see one relay.

As before, the operation of the C1 relay closes the 4 and 5 contacts of C1.

However, this time instead of completing the path, ground now from the total bet relay passes down through the same path, 3 and 4 of R1, through 3 and 4 of CN, through 3 and 4 of C2, through 4 and 5 of C1, through the 1.4 winding of acknowledgement to 2 and 3 or acknowledgement relay to 1.4 winding of the SMR through 1 and 2 of the TR, down through what we call our key common bus, to a point on a hundred thousand ohm resistor.

THE COURT: Not shown or where is that?

A We -- at the bottom, R12, we follow horizontally to the right and we come to a hundred K.

THE COURT: Oh.

A Feeding the thyratron -- the grid of the 83 -- 5883 thyratron.

Q Mr. Fosse, at this time, as you come down the line from contacts 2 and 1 on the TR relay, you pass the R1 switch connection; is that correct?

A I'm sorry. It will -- we also have a path that goes out through the R1, through the fuse to spring 2 of the BC, but the BC relay being unoperated it goes no further.

Q Right.

That circuit has been opened by the --

A Has been opened at that point. So the only electrical path is the one that I have indicated.

Ground at this point causes the thyratron to fire, energizing the ASR relay, which latches through its own contacts 1 and 2 to the off 5 -- 5 and 6 of the off normal and in turn, closes --

THE COURT: Wait a minute. Yes? Okay.

A -- and in turn, closes contacts 3 and 4 of the ASR, which energizes the key release solenoid, restoring the key to normal.

THE COURT: Yes?

Q In the system that was at Aqueduct in 1960 or '61, was there any provision for otherwise checking the entry data other than the scratch mechanism or switch you have just described?

A Yes. In the event that we had a cross between two runners.

Q What would happen there? Just generally?

A Again, if we follow the same path as we did before, through the collector and through the acknowledgement relay, through the SMR down through runner 1 and if we now have runner 1 and 2 energized, we would find that path to the BC associated with run ner 1 and through the BC associated with runner 2 to negative 50 in back of each runner bet relay.

This would divide the current and since the runner bet relays were designed and margined not to operate on half their current, neither runner bet relay would operate.

The total current through the total bet relay would increase slightly but it still had sufficient -- had more than enough current to operate and therefore, would become operated.

The failure of the runner bet relays to operate would prevent us from receiving acknowledgment voltage or

ground at the total bet relay, which would remain operated.

The contacts 3 and 4 of the bet relay would hold the slave relay energized, which in turn would hold motor magnet switch energized. Also contacts 3 and 4 of the slave would pass ground through the delay circuit which after a given time would operate an audible and a visual alarm.

The operator in charge would have the lack of alarm indication in the runner and an alarm indication in the total would indicate to him that he had a cross-runner condition and with his cross-runner test set, he would test for the runners that were crossed.

(continued next page.)

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DIRECT EXAMINATION

BY MR. ISNER: (Cont'd.)

Q All right. Now, going back to the scratch operation or betting on a scratched horse you had before, it's my understanding that the -- in the operation of the ASR circuit, when the horse lockout or scratch switch has been actuated, that the net result of the operation described was to put the 100-K resistor in the grid circuit of the ASR thyratron tube at ground potential, from some previous level, is that correct?

A That's correct.

Q All right. A change in condition at the 100-K resistor in the ASR circuit which resulted from the operation described be considered as a rejection signal?

A Yes, sir.

Q How are -- how are the odds -- how were the odds calculated in the Aqueduct system at 1960 or '61?

A With an analog computer.

Q What is the take, what is the -- what is known by "take" in parimutuel betting?

A That is the -- the amount deducted from the total pool reserved for state and track management.

Q Is there a formula for calculating the odds on a given runner?

A Yes.

Q How do you do it? Just for the record.

Q You deduct the total amount -- the take from the total amount and you divide the amount wagered on an inside runner into the remaining amount and this gives you the odds.

THE COURT: You get 85 per cent of the pool?

THE WITNESS: Use 85 per cent of the pool and you divide the amount on an inside runner into this and you now come up with an odds, a dollar pay.

Q Let's see if I understand this right. The odds for a given horse are equal to the total amount that was wagered on that horse?

A Yes. Less a take.

Q Less a take, divided by?

A The amount bet on an individual runner.

Q Bet on that same runner?

A That's correct.

THE COURT: No.

THE WITNESS: On --

MR. ISNER: I got it wrong, I think.

THE COURT: The aggregate bet on all runners entered in the race?

THE WITNESS: That's right.

MR. ISNER: All right.

THE COURT: See. You divide the amount bet on each horse into 85 per cent of the total wagered on the race.

MR. ISNER: I see. Right.

THE WITNESS: That's correct.

THE COURT: In New York?

THE WITNESS: That's correct.

THE COURT: I suppose it differs all over. Or, it was, I guess. We are looking at old numbers.

THE WITNESS: I think that's quite old.

BY MR. ISNER:

Q Now, in your view, do electronic totes have a higher degree of reliability than the electromechanical totes?

A We have found it to be so.

Q You have? Is there any difference in the amount of maintenance required, in terms of personnel?

A We have more people in our electronic systems tote rooms than we had generally in our electromechanical.

Q Is it increased reliability of the electronic totes due to the use of duplicated units?

A Yes. To assure ourself reliability, we use duplexed systems and in fact we keep a third computer on

standby.

Q In the electromechanical units, were the systems duplicated in any way?

A No. We had spare adding machines that could be changed from time to time. Whenever needed.

Q Has there been any change, effective change in the time required to service a bet at a betting window? As we described earlier, from the time the man steps up, puts his bet, gets his ticket and gets away?

A I don't think there has been an appreciable difference.

Q Is there any great change in the size of the units, from the electromechanical to the electronic?

A Not too great.

MR. ISNER: Your Honor, I think I am at the end of Mr. Fosse's direct, subject to review with my compatriots here of any possible points I haven't taken.

THE COURT: 2:00 o'clock?

MR. ISNER: Fine. Thank you, your Honor

(Luncheon recess taken)

(Continued on next page.)

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AFTERNOON SESSION

OLE FOSSE, called as a witness, having been previously sworn by the Clerk of the Court, resumed the stand and testified further as follows:

MR. ISNER: My direct examination is concluded, your Honor.

THE COURT: Mr. Yuter.

Was AA offered in evidence?

MR. ISNER: I will offer Exhibit AA in Evidence at this time.

MR. YUTER: No objection.

THE COURT: It will re received at this time.

THE CLERK: Plaintiff's Exhibit AA received in evidence.

(So marked.)

CROSS-EXAMINATION

BY MR. YUTER:

Q Mr. Fosse, I want to take you back to your schooling at NYU.

How many semesters of your electrical engineering course did you complete?

A I don't remember. It was back in 1938, '37, '38, '39.

I attended for about, oh, some four years, although I didn't take full credit because I was working nights.

Q When did you enter into active service for the United States Army?

A That was in 1940 -- '41.

Q Your radar training, was that at an Army Signal Corps school?

A That was at Fort Monmouth and at Camp Murphy in Florida.

Q Do you recall how long that training was?

A I believe it took about eight months all together, including the radio procedure.

Q What was your army specialization number, do you remember, your specific number?

A As a specific number, I don't remember it, I was -- I was -- After leaving school, I made rather good marks and I was promoted from a private to a master sergeant.

Q In what period of time?

A Oh, I would say that was within about four months of the time I left school.

Q Was the schooling principally in electronics?

A Electronics, yes.

Q Did it include any digital computer technology?

A Not as such, although in radar, digital type of pulse technology is studied.

Q When you went overseas and worked initially in

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maintenance, what type of equipment did you maintain?

A The -- when I arrived in England, we established a group and we maintained -- the first equipment we maintained was frequency modulated transmitters to receivers used in armored equipment.

Q And then?

A About a year after that, I took charge of a group of men who did maintenance on -- in an ordnance depot and we also re-installed new equipment and took out obsolete equipment out of armored tanks and weapons carriers and half-tracks that were already in the European Theater of Operations.

Q That was then all communications equipment?

A Yes, sir.

Q Did it include any equipment utilizing pulse techniques?

A At that particular point I would say, other than some radar equipment that we did maintain.

Q What was your rank when you were discharged?

A I was a captain.

Q When were you commissioned?

A I was commissioned, oh, about, I guess, about 18 months after I arrived in England.

Q As second lieutenant?

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A Second lieutenant.

Q When you set up these depots in the Paris Liege, etc., you were then an officer?

A Yes, sir, first lieutenant and part of the time a captain.

Q You were responsible for the administration of non-commissioned officers who did the maintaining?

A Yes, sir, I was.

Q Did you yourself do any technical work over and above administration?

A I did help men, technicians when they became -- found difficulty in solving a problem.

Q Then when you were discharged as a captain, you went back to American Totalisator Company?

A That's correct.

Q As I understand your testimony, you became manager of the field service department about six years ago?

A That's correct.

Q When did you first have contact with any digital computer technology?

A About 1957.

Q In what context was that?

A That was -- I went to Paoli, which was the Burroughs Research Center to become familiar with the

Burroughs E-101 desk size general purpose computer.

Q How long did you spend at Paoli, and was that a full-time training job?

A I was there, oh, I would say about four weeks.

Q And you spent full-time four weeks learning about ithe E-101?

A Yes.

Q When you were through, were you knowledgeable about the logical design of the E-101?

A I was reasonably knowledgeable. I had also been very -- as having interest in electronics, I had done a study on digital techniques on my own.

Q To what extent was your self-study?

A Generally reading books.

Q This was just prior to 1957 or was it through the years?

A It was through the years.

Q What was the purpose of your studying the Burroughs E-101?

A To ascertain whether there could be used -- modified to be used to do price calculations at the racetrack.

Q What was your own recommendation, if you made one, to your management?

A My recommendation was that we could use this

CROSS-EXAMINATION

BY MR. YUTER: (Cont'd.)

Q I'm sorry, at Roosevelt, right 64, so that you would have to duplicate that Plaintiff's Exhibit 140 how many more times?

MR. ISNER: Are youasserting this, Mr. Yuter, or are you asking the witness about it?

THE COURT: You must ask him.

THE WITNESS: I would --

THE COURT: In other words, if you wanted to automatize, if that's the verb, daily double betting with the electromechanical system, what additional equipment would have to be added?

THE WITNESS: Going by what we did to do an electro mechanical Quinella tote, the amount of equipment required would not be as great as it would indicate because we could, indeed, perhaps even put as many as seven combinations on one adding machine, because of the number of channels required.

The most daily double betting is $2 and $10, which means the maximum would be two channels. So, therefore, the amount of equipment would not really, as you might indicate, would be three times as much as we have now.

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FOSSE-CROSS

BY MR. YUTER: (Cont'd.)

Q And how much would that have increased the cost?

A I don't really know.

MR. ISNER: I was going to object anyway.

THE WITNESS: Basically, the reason it wasn't done, I believe, is because the daily double was only used one race a day. At the time -- I don't know the reason why, it was just apparently a management decision not to go this way.

Q You testified yesterday about that. Returning to Defendant's Exhibit AA, if the power is turned off, I mean there is no minus 50 or minus 110 being fed --

THE COURT: Anywhere?

Q Anywhere, there is no power and let's say even the ground is disconnected, are there any signals present?

A If all power is disconnected, obviously not.

Q Why is that?

A Because with no power there is no potential differences, there is no voltage supplied to anything.

Q Well, suppose a relay has some normally closed contacts and these relays are normally closed, isn't that

A No, you would not.

Q Mr. Fosse, you don't own any patents or have any patents in your name; do you?

A I do not.

Q You referred to an electronic scanner in -- you referred to an electronic scanner that Amtote tried out in 1946. Would you briefly describe the nature of that scanner and the results of that project?

A The system that was built at that time consisted of vacuum tubes and thyratron type of devices, with, of course, resistors, capacitors and whatever the other components that were available at the state of the art at that time.

The system that was built was run for approximately six weeks at Roosevelt Raceway. The main problem at that time was that we did have periodic vacuum tube failures and -- although I do not know management's decision for discontinuing the project, I presume that they felt that a Simplex electronic system built with components available at that time did not offer any advantages over what we were offering the tracks with our electromechanical system.

Q Was that project solely an Amtote project or was it jointly with another company?

A We contracted the development to a John Potter, P-o-t-t-e-r. I believe this subsequently became Potter Instrument Company.

you don't know whether it was used or not?

A To the best of my knowledge, in the 35 years that I have worked with American Totalisator Company, we have never used a machine of that type with 10 runner keys and that modification on the ejection chute.

Q Can you tell us if there is any difference in the name plates?

MR. ISNER: Again, your Honor, I am going to repeat the objection on the lack of relevancy. I don't see what this has to do with the man's testimony.

MR. YUTER: I think it has a great deal of relevancy and I would like to have a few moments to explain that to you as best as I can.

In the John Dearie case, the Supreme Court stated the following:

"Under Section 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or non-obviousness of the subject matter is determined."

Then it goes on about the secondary considerations. And then in our own Court of Appeals, Judge Learned

Hand stated in Reiner --

THE COURT: Reiner, usually.

MR. YUTER: "The test laid down is indeed misty enough. It directs us to surmise what was the range of ingenuity of a person having ordinary skill in an art with which we are totally unfamiliar. And we do not see how such a standard can be applied at all except by recourse to the earlier work in the art and to the general history of the means available at the time. To judge on our own that this or that new assemblage of old factors was or was not obvious is to substitute our ignorance for the acquaintance with the subject of those who were familiar with it."

We have a very unique situation, your Honor, as far as patent suits are concerned.

I have always heard about the mythical man skilled in the art that we are supposed to create like the reasonable man. But I think this is the case -- at least, for me, it's unique in that we have in Mr. Fosse the average man skilled in the art. We don't have to conjecture about who this man is and what he would do.

And I think now that we have him here we can find out from him what is the level --

THE COURT: What was the --

MR. YUTER: What was the level in 1961-62 of the skill in the paramutuel art at that time. And what we propose to do is -- and we would like to make an offer of proof, if you should exclude it, is to introduce into the record a whole sequence of prior art American Totalisator patents. And to the extent Mr. Fosse has any knowledge about them, I would like to have him explain them to the Court. And I think with that range we will then find at least working up to 1962 what the average man skilled in the art thought about various technologies and what his company thought was patentable, and whether or not the patent office was right inissuing the patents.

And I think if you can show a pattern of improvements of a certain quality which Amtote thought was patentable, and, indeed, got patents, then that represents a skill higher than the average skill in the art. But certainly at least the average skill. And we think that's the history of the art that the Supreme Court referred to and Judge Learned Hand referred to. And I think that as far as determining whether our claims are obvious or nonobvious, certainly over the electromechanical tote, I can't think of anything more relevant than the relevance of this

line of testimony.

We have a few patents on the TIMs which is not specially as important as the other American Totalisator patents that show the development of their art by Amtote which had substantially all of the business in this country prior to 1961. And I think that we have this unique case where we can determine as a fact the man -- the average man skilled in the art and what Amtote thought was patentable, and, therefore, what they thought was an invention.

THE COURT: Well, I don't quite see what this question has to do with that.

MR. YUTER: Okay. Well, I was going to indicate that whoever owned these patents -- and they are quite a group of them on there -- that this indicated that there are a lot of patentable inventions, at least in the sense of applications being filed. I am not talking about their validity. It is just that someone thought that an improvement in the Bell punch machine, which is apparently, exclusively, a license to Amtote in this country, was patentable. And I think that's a measure of the skill of the art, during the -- this period prior to 1961 and '62.

MR. ISNER: If your Honor please, it is my

understanding in this case that the machine, the ticket issuing machine, which is the very point on which this came up, which we used at Westbury and which were there before there was -- there was nothing different about it. They just used the standing ticket issuing machine. What relevancy is there to this question apart from the broader question that Mr. Yuter raises. There are millions of patents that have been issued. That is not a proper way to prove or draw any conclusion from it.

MR. YUTER: We are only --

MR. ISNER: Besides, this witness testified as to what he did and what his state of knowledge was. If Mr. Yuter wants to do this in this case, I suggest he go out and get his own witness to do it. There is no relevancy in the point of this case in directing this question to this particular witness, particularly on ticket issuing machines.

MR. YUTER: Well, the Judge already said that Mr. Fosse is our witness. He is here.

THE COURT: What?

MR. YUTER: You said we have made him our witness, which is true. This is not within the scope of the direct, assuming the Court follows that rule. And I

should really indicate that the proposed rules of 2144
evidence does not restrict me to -- you can direct otherwise -- but this is much more than that. We have a unique situation where we have -- the Court has an opportunity to learn from the horse's mouth literally -- well, I don't -- from the man skilled in the art mouth -- what the level of skill was and what was above the level, and getting a feeling for six or eight patents which we have in mind, the ticket issuing machine, that this is relevant in the prior art. But that is not specially important. It is the totalisator patents.

I think we can provide the Court with a very good historical background to measure the advances if any with our patent.

MR. ISNER: That, of course --

THE COURT: Well, I don't know. I mean that that seems to suggest that you ought to ask Mr. Fosse what the applicants asked the Patent Office. The Patent Office granted the patent, which is -- as it is supported by statutory presumption of validity. I think if you -- I think the file history shows what classes were searched, what prior art was referred to. And I don't quite see where Mr. Fosse can

help us. He has told us -- it's beyond what he's already told us. And I don't quite follow you in saying that he would know the level of the prior art. I don't quite know what you mean by that.

MR. YUTER: Well --

THE COURT: He is -- as I understand it, he has worked in the field. He is not a construction man. He is not on the shop floor. He is the -- I suppose you could say consumer of these machines and not a deviser of them. That is to be sure. Since he has made it his responsibility and has had some experience at least in designing and started out as a technician in the field, he happens to know what to do if left alone with a set of these devices at the track. I don't think that that would constitute him a person skilled in the art in the sense in which Mr. Justice Clarke meant to use it.

You would not go to Mr. Fosse to order such a machine. You would go to a person skilled in the art. I don't know whether you would even go to American Totalisator or its parent company. I don't know whether they have the manufacturing components the way American Tel & Tel has or not.

But anyway you would go to people who make

such devices.

Or to put it a little more exactly, who provided goods for those people who needed devices in posing the demands which mutuel betting imposing. Because I think here we are talking about something which I guess the witness has told us, mutuel betting has been going on somewhere since at least the turn of the century.

So by this time people must know what is -- what the needs of people operating mutuel betting establishments are, whether they are people who supply such equipment, design systems, I don't know.

Digitronics indicated that it is ready to design such systems, but treating it as systems design. I think one of the exhibits that we have here most recently brings that out, Exhibit W -- or one of them.

MR. ISNER: Yes, sir.

THE COURT: That is one approach to it. The other approach is to be the holder of components. It seems to me that absent Digitronics they have the right -- you wouldn't expect to go to Digitronics to have ticket issuing machines built or computer elements built or anything else. But you would perhaps go to them or to such an organization or to Data Trends, Inc.

or somebody else like that to outline the demands of the occasion and have them devise a system, locate the componentry and its place of optimum manufacture, a place where you can get the components and the capacity for the needs of that job. And so that I would rather suppose that that's what the -- would be meant by the people skilled in the art here, although it would be -- it would tend to look in this sort of case a little like a cohort. That is, systems people and component people. Because the systems people would be designing the system and the component people would be presumably certainly trying to devise ever more adequate and inexpensive components to fit in such a system.

Now, here we are dealing with a system pattern and not with a component pattern. Emphatically, not with a component pattern. Because no componentry is described. And if I remember rightly, there isn't anywhere in the patent any specification of particular detail, electrical or electromagnetic or electronic circuitry. There are indications that in terms of -- if you want to put it that way, logical functions that are exacted and, indeed, they are formalized, but -- so I don't think that when we look at Mr. Fosse, we

are looking to the right kind of person skilled in the art or knowledgeable about the level of skill in the art when we are talking about the kind of art that we are talking about here.

So on that ground I would not think that further inquiry along these lines would be useful. I think we have all the prior art, of course, to resort to to help us to understand the level of skill in the art to the extent that it can do so, although you are quite right in saying that seems a little odd because if it weren't somewhat above the level of skill in the art, by definition, the patent should have been granted. But each patent as it is granted discloses to the public a new level of skill in the art, which then becomes part of the art of skills of the Section 103 man. I mean, the Section 103 man is the man with the prior art as well as with the skills of his trade. But the prior art is his basis and he moves on from there with his ordinary skills in effect to exhaust the ready implications of the prior art which doesn't mean sticking with it, but accepting its manifest implications and moving head in the usual way.

I still haven't found the one man who is

ordinarily skilled in the art. In one case I think counsel on both sides stumped me by agreeing that the average MIT graduate was the person of ordinary skill in the art. I wasn't quite so sure the president of MIT would appreciate that.

Anyway, that's about what I conclude.

MR. YUTER: Your Honor, let me just briefly say how I and how the plaintiff views the questions presented by the Supreme Court in determining obviousness or nonobviousness of the subject matter of the claims.

(Continued on next page.)

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THE COURT: Yes?

MR. YUTER: First, it is our view that the art is the parimutuel totalisator art.

THE COURT: I couldn't agree with that. I don't think there is any parimutuel totalisator-building business. I think it is a totalisator-using field, and there are certainly firms, obviously, which specialize in distribution of totalisator equipment for parimutuel betting. But I wouldn't think that it is anything except a specific application in one narrow field of manufacture.

MR. YUTER: Second, we think the time that we look at this man skilled in the art is in 1961.

THE COURT: No question about that.

MR. YUTER: Or whenever the inventions were conceived.

Third, and most important, we think that there is another element in solving problems, and in moving technology forward, and that is money. There are many engineers who are ready to spend anyone else's money to try to solve many problems, and the key thing here which I think was most important in this partnership between Digitronics and Roosevelt Raceway was that Roosevelt was willing to gamble the money. And without the money,

the Westbury Tote never would have been made.

Roosevelt Raceway was only interested in the totalisator art. It was this partnership of the Roosevelt Raceway know-how as far as the problems were concerned to be solved, as has been brought out very clearly with Mr. Lynch telling Mr. Leonard what they wanted to accomplish, it was Roosevelt's gamble, at least to spend the money for the demonstrator, to see whether they should spend the bigger amount of money.

You will find, when we hear Mr. Weil's testimony, that until the system actually operated -- and I believe he meant in March, '63, but it could have been April, '64 -- they were not sure they had spent their money wisely, and without the patent system, and without the incentive provided by the money people, to come in and pay the engineers who are ready to do almost anything and solve any problem with your money, this invention would not have been made.

I think in that context --

THE COURT: I am afraid that begs the question.

MR. YUTER: In any case, it is our view that the art that we should look at --

THE COURT: There are too many things -- Mark Twain lost most of his fortune trying to, I guess, beat

Merganthaler to the punch on a linertech machine, was it? I know it was one of those ones that depended on getting the right margin right.

MR. YUTER: But to get back to American Tote, American Tote was more than a construction company. By it's own testimony here, and by the documents, they spent large amounts of money in research and development, apparently in part in-house, and apparently in part outside at MIT, at Potter, and apparently elsewhere. And they did a lot of design work, they did some very ingenious things.

I have to say this DX-AA system is very ingenious, it solved the problems that they had at the time --

THE COURT: I think the witness told us that, so did the patent office, but he hasn't told us whether it was ever challenged.

MR. YUTER: He is not an expert on patents.

THE COURT: He might know if they have every been sued.

Were you ever sued, or did you sue anybody on it?

MR. YUTER: I would ask that question, your Honor, and someone would get up in the back and object vehemently.

THE COURT: Because lawsuits are a matter of

public record, and they are also in the back pages of the file wrapper somewhere.

MR. YUTER: It is Plaintiff's view that in 1961 the art was the parimutuel totalisator art, that Am Tote as a group, as a fictional group, as an entity, was the man skilled in the art; that they had done research and developed improvements in their own system; that they experimented with electronic systems; that they spent, in their own words, hundreds of thousands of dollars, perhaps even each year, on research and development, and that in the absence of anyone else from Am Tote, Mr. Fosse is the only man we have to ask these questions. If he doesn't know the answers, he will tell us, but at least I would like to try.

THE COURT: No. I think I have ruled completely on that point.

MR. YUTER: Can we at least make an offer of proof? By that I mean I would like to mark for identification these series of Am Tote patents that are not already in the --

THE COURT: Sure, you can mark them in evidence, if your wish.

MR. YUTER: I would like to put them into evidence your Honor. They are admissible as patents, and I do

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paper work in the department and to verify the computer prices."

Is that correct?

A Substantially correct.

Q Do you have any qualification?

A I think it does state that it was reduced to a skeleton force and I believe I testified before that -- where the price computer was introduced, in most cases the calculating room staff was reduced from a total of nine to a total of three.

Q Then it goes on: "The introduction of this price computer by the American Totalisator Company is a 'major breakthrough' in bringing complete totalisator service to the tracks."

Was that also true?

A I am not a salesman so I would consider that perhaps on the part of a salesman it might be considered. I didn't so consider it. I thought it was applying the state of the art to the problem.

Q Then Mr. Hardin was misrepresenting the fact?

A I don't believe he was misrepresenting it. I think that he stated that in his opinion it was a breakthrough -- it was something that had not been done at the racetrack before.

Q Would you say in his opinion it was a major

4 Fosse-cross

breakthrough?

A He may very well have considered it such.

Q And then the last paragraph says "Knowing that your association..." -- this is addressed, your Honor, to the Roosevelt Raceway -- "...has always been a leader in bringing its patrons the best in comfort and service, we feel sure that you will wish to advance that service by using this new price computer. As these computer units are expensive and require several months to build and test, we will appreciate hearing from your association at an early date so that we can anticipate our requirements for next year."

Is that statement true, to the extent that you know?

A Substantially, I believe. Again, I say, a salesman writes a letter differently than I do.

Q What is the reference to "test"; it says "build and test"?

A We did indeed build and test these units. We purchased the arithmetic center, which was the computation center. We did then design all of the remaining control elements required to operate this.

Q Was what you purchased known as the DE-60?

A It was a variation of the DE-60. It was a

takeoff. It was the arithmetic center used with the DE-60.

Q That had a magnetic drum memory?

A That is correct.

Q That was just the guts of the system you built around?

A That's right.

Q Your team designed all the interfacing, etc., for that?

A That's correct.

Q The DE-60 was generally an available commercial unit that could have been used for many purposes?

A The commercially available unit was not really the one we used. It was an adaptation of the arithmetic center of the DE-60.

Q In accordance with your specifications?

A To our specifications.

Q Going back to the first paragraph, the last sentence says "Our engineers have now completed and field-tested a new computer which embodies the most recent advances in the computer field, using solid state electronics for greater speed, accuracy and simplicity of operation."

Was that statement true in 1961?

A I believe substantially true. We now had several of these in use. I believe that at that time we

had already had the installation at Aqueduct. We had replaced the existing Burroughs unit at Aqueduct and we had already a meet at Gulfstream Park at this time.

Q How big was the design facility at American Tote in 1961?

M MR. ISNER: If your Honor please, I object to this again on the lack of relevancy in this case.

MR. YUTER: I think it is very relevant. The Court just got through telling us that it thought that American Tote was just a builder, not a designer, and I am trying to show that American Tote was a designer of systems as well. I can't think of anything more relevant at this particular moment.

Would you read the questioln.

(Question read.)

THE WITNESS: Our design facility at that time consisted of a chief engineer, who was full time, and his staff consisted of anywheres from two to perhaps as many as five of our field engineers who worked in the engineering capacity during the time they were not normally employed at the racetrack, as supervising the operation of the totalisator.

Q With respect to the Clary project, were there any additional people availabe to do design work? In other

words, did you come under the administration of the chief engineer or were you a separate group?

A I came under the administration of the chief engineer. We were assigned -- there were two of us who were assignedsthe project to develop this.

Q Other than those you just mentioned?

A I at that time also served as a field engineer. The design work on this was done during the off season in the winter and I believe it was -- it began in late 1959, completed in the winter of '60 . I had one man to assist me. The total elapsed time was perhaps four months.

(Continued on next page.)

Do you recall whether any demonstrations were made to cutsiders in which ticket issuing machines were used which could issue tickets?

A I don't have a recollection.

Q Generally, what were the principal differences between the demonstrator and the Westbury tote as it was operated in January, 1963?

THE COURT: The first tote?

MR. YUTER: The first tote, the Wastbury tote.

MR. ISNER: I understand wasn't operable --

MR. YUTER: It should have been March?

THE COURT: That was demonstrated on March 8, 19 --

MR. YUTER: I'm sorry.

THE COURT: Is that it? Or was it the 7th?

MR. YUTER: The 6th, 7th and 8th?

THE WITNESS: Yes.

THE COURT: Yes.

BY MR. YUTER:

Q I should have said -- thank you for straightening me out. I should have made March. Let's say March 6, 1963.

A The first totalisator could accomodate simultaneously daily double and regular betting and the

demonstrator could not. The demonstrator worked with 15 or 16 simulated ticket issuing machines and on occasion a real ticket machine, with regards the first totalisator worked with -- at that time, about 20 real ticket machines. The demonstrator did not use an interrogate line to go out to the simulated ticket machine or actual ticket machine and read out the data. With regards, in the first totalisator interrogate signal was transmitted to each ticket machine to read out the runner data. The --

THE COURT: Wait a minute.

A Yes.

THE COURT: Could you read that, the interrogation answer back?

(Read)

THE COURT: Yes.

A In the first totalisator, the ticket machines had rejection signal responsive means as described by the patent, and could receive a rejection signal from the central equipment, to clear the keys automatically, restore the keys automatically, without issuing a ticket. In the demonstrator, if for some reason a transaction was not going to be confirmed, it would simply be ignored and the person operating the simulated ticket issuing machine or a real ticket issuing machine would have to operate the clear or

reset key to restore the keys to normal or to put them in position or condition for placing a subsequent transaction. The simulated ticket machine and the --

THE COURT: Wait a minute. Yes?

A The simulated ticket machines of the demonstrator and any real ticket issuing machine did not put out a bid signal. The ticket machines used, with the first totalisator, did put out a bid signal for use in the central equipment.

THE COURT: Just a minute. Yes.

BS fls.

(Continued on next page.)

THE WITNESS: The demonstrator did not include such error checks as the false entry test or the scan test, which were included in the first totalisator.

THE COURT: Yes.

BY MR. YUTER:

Q Mr. Weida, in what way, if any, did the systems defined by Claims 20 and 21 relate to dual processing.

THE COURT: I think the question is, or should be, what way, if in any way, do Claims 20 and 21 relate to a dual system?

THE WITNESS: I believe they relate in that Claims -- let me just look at Claims 20 and 21. I think that the things said in Claims 20 and 21 make the realization of a duality parimutuel data processing practical and achievable in a reasonable way by using core memory and using a single aggregating element shared by the many registers required, and by providing a single path to the aggregating system on each side so that it would be relatively easy and efficient for this dual system to compare the address information being presented to each aggregator and thereby check that part of the dual system, and to also be able to check the output information from the aggregator, again in a simple way, by comparing the

output to the output device on one side versus the output to the output device on the other side.

This would be in contrast to an electro-mechanical system where, even when you stick to regular betting, you have to be comparing, let's say, the 39 adding machines on one side to the corresponding adding machines on the other side, not to mention the question, or the matter of cross-checking the betting combination -- combination betting automatically.

Q What do you mean by "combination betting"?

A The doubles, quinella, twin double or anything more elaborate than the usual win, place or show bet.

Q Mr. Fosse testified that his company did not provide electromechanical equipment to aggregate daily double bets because of economic reasons.

What permitted, from an economic basis, the first tote to process combination bets like daily doubles on an economically sound basis, if any?

A Well, I think the fact that you had already the core memory and the shared aggregating element -- if you had that, for example, for win, place and show betting it was not a long step in terms of equipment and cost to use a somewhat greater number of core memory registers which, on a marginal cost basis, are pretty cheap, to

the means for dealing with the combination betting in an economical way, I think that is an important advantage. I think that is an important advantage.

I think the fact that it makes economically relatively easy the provision of the dual system is an advantage.

I think the availability in coded form of the ticket machine number, which locates the provision -- something like the window print-out is an advantage to be taken note of. That generation also provides the basis for interrogating the ticket machines and also for associating -- with group associating a pool number and you can associate with a group of ticket machine numbers a pool in denomination -- that is another advantage of having generated the ticket machine number for use by the aggregating system.

I think in general, specifying the references to the solid state technology points out that this is a system that can participate in the general and ever-increasing advantages of the economy and speed that you get when you have a system that does use solid state technology.

I think that's all I would have to list at this time.

the fact that we have the two paths through the system, two independent paths through the system, excepting for such things as the ticket machines and the ticket machine memory, and that is aside from the fact that there are unduplicated members in the system, like the ticket machines, and error in one of them will cause both sides to halt, whereas an error in side one of the duplicated portions will only cause that side to halt, and cause a switchover to the other side as master if the failing side was the master. Did I get at the --

Q What is the simplex mode?

A In the simplex mode, we elect to have either one side or the other operate, say the A side, in which case, the B side has no function; there is no comparison of A side to B side, and any error anywhere detected on the operating side will cause the system to stop.

Q So that in a simplex mode, it is as if there is no dual computing.

A In the simplex mode, there is just the one string of elements from the ticket machine through to the output units. Either the A side simplex or the B side simplex.

Q In your cross-examination there was a reference to the fall-back recorder attached to each ticket-issuing machine.

THE COURT: What was that?

Q You used the term "fall-back." What was its function, and was that function related in any way to a function in the prior art Electro-Mechanical Systems?

A The purpose of the -- Well, as of the 1964 operation of the Westbury Tote, each of the ticket machines had a little tape recorder mounted on the side, and every time the ticket machine cycled, that tape recorder would operate to record the nature of the transaction.

I don't remember what happened with a test ticket, whether that didn't produce a recording, or whether it produced a recording identifiable as a test transaction, I don't remember that.

In any event, aside from that, every transaction would leave a magnetic pattern on the tape, which would be interpretable as whatever kind of bet it was, a regular bet on horse number three, or a double bet on --

THE COURT: Sort of a continuous magnetic print-out?

THE WITNESS: Yes.

THE COURT: Or print-on.

THE WITNESS: That is, every -- Another way of stating it, I guess, is that every runner number transmitted to the central equipment and confirmed would show

up on the tape, either for confirmed regular bet or a pair of numbers for a confirmed double bet.

This was a means of meeting the legal requirement that each ticket machine in New York State have locally a record of the activity at that ticket machine, and the cartridges produced by each ticket machine then would be taken to an independent unit, would be read in, and you would get a count of the bets on each of those cartridges, or on the sum of the cartridges when you processed the number of cartridges.

You could, indeed, given the time, get a summary aggregation value of the activity at the track by processing a cartridge from each ticket machine.

THE COURT: That would be a cartridge like an eight-track or a cassette-type of cartridge?

THE WITNESS: Removable, yes.

Q So that if there was some catastrophy at the central control in the aggregating system, the information as to what the betting was was still available at the TIM's?

A Yes.

Q How was that function performed in the prior electro-mechanical totes, if you know?

A I guess we have made some mention or description of the array of mechanical counter take-offs located in the

ticket machines, such that whenever a bet is successfully -- whenever a ticket is successfully issued, you would index the appropriate mechanical counter, and we have a sheet over the exposed surfaces of the counter, and by passing the roller across this carbonized paper, and the face of the counters, you get an impression as to the state of the counters when the betting had ended.

THE COURT: Is that somewhat like the tape that one sees come out of a tape cash register in a supermarket now?

Only, I take it, it was not allowed to fall on the floor.

THE WITNESS: Right. It is a cylinder --

THE COURT: Which prints every cash transaction as the keys of the cash register are depressed.

DS fls

(continued on next page.)

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THE COURT: There is a picture which shows the members. We have a photograph of one in here with the numbers showing. And I think there is a description of its operation somewhere in the record here.

And then that would print out a ribbon, was it?

THE WITNESS: Well, it is a piece of paper -- a piece of carbonized paper. And when betting is over for that race, by running a roller across the paper which is opposite these counterfaces, then you get an impression on the carbonized paper, the state of those counters when betting is complete. So only after the betting is over do you run the roller across the carbonized paper to get an impression about your state of the counters --

THE COURT: In other words, that would be the total?

THE WITNESS: Only the total.

THE COURT: It couldn't give you the detail of the transactions?

THE WITNESS: No. You would not know in what sequence the bets had occurred, if you were interested in that. But, you would immediately get the aggregate total.

THE COURT: Yes. And that aggregate would show the number of wagers by key, and therefore starting gate position, if I can put it that way?

THE WITNESS: Yes, sir.

THE COURT: As well as the total number of wagers on the race?

THE WITNESS: Yes.

THE COURT: And since these particular TIMs were one quantity TIMs, the rest was just a simple matter of determining whether it is a two, five, ten, fifty or one hundred dollar window?

THE WITNESS: Yes.

BY MR. YUTER:

Q You are holding Defendant's Exhibit --

A I guess it is Y.

THE COURT: That is a comment on the handwriting?

THE WITNESS: Well, Y could be -- I believe it is Y.

THE COURT: Is this a convenient place to break?

MR. YUTER: Yes, it would be very fine.

THE COURT: All right, we will have a recess now until two o'clock.

(Thereupon, at 12:59 o'clock p.m., a recess was taken until 2:00 o'clock p.m.)

A I believe so.

Q So really the interrogation signal is nothing but a voltage on the line that is connected with the TIM in the patent?

A I see nothing wrong with that statement.

Q Now, as I understand it in the demonstrator unit when the switch was depressed, wasn't there a voltage on the line connected through that switch?

THE COURT: I am sorry.

Q In the demonstrator units, let's take the simulated and/or the ticket machines, wasn't there a voltage on the line through the switch which was depressed to indicate the runner key?

A But there was no signal characteristic of the window being scanned, transmitted to the ticket machine as was the case in the first totalisator.

THE COURT: Well, wait a minute, let me hear that answer. Well, I need the question, too, I guess.

(Record read.)

(Continued on next page.)

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RECROSS-EXAMINATION

BY MR. ISNER: (Cont.)

Q The only thing that --

THE COURT: Just a minute.

As what is transmitted to the TIM? The voltage?

THE WITNESS: Well, --

THE COURT: Is this the answer?

But there was no signal characteristic of the window being scanned and transmitted to the TIM as was the case in the first tote?

THE WITNESS: Perhaps I'd better try to answer it again.

THE COURT: Yes.

THE WITNESS: Inthe demonstrator, the input to the runner number switches was a DC voltage through--

THE COURT: Just a minute. To the runner numbered switches was a DC voltage?

THE WITNESS: THrough a couple of motion detection relay --

THE COURT: Motion detection?

THE WITNESS: Motion detection relay contacts. The input to the switch runner line switches --

THE COURT: To the runner what switches?

THE WITNESS: The switches, the readout switches for the ticket machines.

THE COURT: To the runner readout switches?

THE WITNESS: Yes.

THE COURT: Yes?

THE WITNESS: Had no connection to any logic signal, such as a scanner interrogate signal from the central equipment. But in the first totalisator, the input to the selected entry transaction switches is a signal from the central. In particular, the signal is the interrogate line from its interface.

THE COURT: From the TIMs' interface?

THE WITNESS: Which in turn depends on the scan -- scanner output for that window. So --

THE COURT: Scanner output to that window or for that window?

THE WITNESS: The scanner output for that window, that goes into the interface. For that window. So it seems to me that the --

THE COURT: Yes, it seems to me that the means of energizing the readout mechanisms in the case of the demonstrator versus the first totalisator, those means are quite different.

In one case, there is nothing external, which

is the case of the demonstrator. In the case of the first totalisator, there is an external input to the readout mechanism, namely, the interrogate signal from the interface block for that window.

THE COURT: Which in 1A would be on the line indicated by the single SC1N1?

THE WITNESS: Something like that. I don't have the patent here.

THE COURT: It's in Fig. 1. Fig. 1A, which emanates from interface one.

THE WITNESS: Yes.

THE COURT: Into which there is an input from scanner SCA, which emanates fromthe scan counter, I guess, in MRA, symbolized, I forget, as SKA?

THE WITNESS: Yes.

THE COURT: And that appears in Fig. 2, extreme right?

THE WITNESS: Yes, your Honor.

THE COURT: As responding to the initial clearance impulse from the console?

THE WITNESS: Yes.

THE COURT: That's the first tote?

THE WITNESS: Yes.

THE COURT: Okay.

Weida/re-redirect/Yuter

RE-REDIRECT EXAMINATION

BY MR. YUTER:

MR. YUTER: One or two questions, your Honor.

THE COURT: You are excused (addressing witness).

MR. YUTER: No, I have one or two more questions, your Honor.

THE COURT: I am sorry. I thought you said no questions.

MR. YUTER: Just one or two.

BY MR. YUTER:

Q At the beginning of your testimony, Mr. Weida, Mr. Isner read from your deposition Page 85, 86.

THE COURT: I think that's the blue book?

MR. YUTER: Yes.

Q And in reference to the daily double ticket issuing machine from Toller & Cooper, this Hohmann machine, and the regular betting TIM from Toller & Cooper, he read the question, were either or both of these units used in conjunction with this demonstrator, and your answer then was yes.

Let me ask you whether they were ever -- whether or not they were ever used together in the demonstrator as part of a working system?

A I don't remember them being used together. And it seems to me that it wouldn't and couldn't meaningfully be used together since each was particular to its own kind of betting, and the demonstrator could not accommodate both kinds of betting at the same time.

Q And then there was a reference to, if there was a rejection of the bet whether the key was unlatched in response to a rejection signal sent from the central.

What was the actual case with the demonstrator when there was a reject of a bet at the central?

A Well, later from looking over the pictures of the ticket machines and the Hohmann patent, and the specifications for the demonstrator, it became clear and I recollected that if the bet were not to be confirmed, then the central equipment would take no action whatsoever and the machine, or the simulator ticket issuing machine, would have to be cleared or restored for use for the next transaction by operating a clear key on the simulator ticket issuing machine or the real ticket issuing machine.

MR. YUTER: No further re-redirect, your Honor.

RE-RECROSS EXAMINATION

BY MR. ISNER:

Q When did you make this review of the Hohmann patent and the other things that led you to change your views?

objecting to a leading question, if you can head it off, is that it cures the evil.

I note at Page 4 in the last paragraph some expression of opinion by Yonkers Raceway on the prospects of the equipment. I wondered whether the witness knew whether or not at the time of the meeting of May 26, 1961, anyone from Yonkers had seen the demonstration machine in operation, a prototype?

A My best recollection is that Yonkers had not seen it but there had been a fair amount of stir in the industry by those who did.

THE COURT: So they were just getting their mind hardened, Salmon against Salmon claim in early.

THE WITNESS: I can't answer that, your Honor. I know that they never came to my attention and they did -- in fact resuscitate this Swedish venture of theirs.

THE COURT: They took another road?

A Well, we never saw that road materialize.

BY MR. ISNER:

Q Mr. Leonard, I show you a document that's been previously marked in this case as Plaintiff's Exhibit 116.

Q Now --

THE COURT: Just a minute.

(Pause.)

THE COURT: Yes.

MR. ISNER: I might state, your Honor, that page 5 has now been inserted in copy BE.

THE COURT: Did I get one?

MR. ISNER: Yes, your Honor, your bailiff did it.

BY MR. ISNER:

Q Were you aware that a patent application was filed by Digitronics on the electronic totalisator in March of 1963?

A Yes.

(continued next page.)

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DIRECT EXAMINATION

BY MR. ISNER (Continued):

Q Did you in any way participate in the decision to file this application?

A Yes.

Q Was there anyone else involved in the decision to file this application?

A Well, I'm sure Mr. Yuter has involved. I believe, as a matter of fact, people at Roosevelt had been eager for it to be done.

Clearly some of our people must have been involved, such as Haight, but I can't be precise as to who exactly participated in the decision.

Q What was your -- what was the extent of your participation?

A I was involved all through. I was -- I was negative about filing.

MR. ISNER: That's all.

CROSS-EXAMINATION

BY MR. YUTER:

Q Mr. Leonard, are you here pursuant to the service of a subpoena on you?

A No, I was informed that one would be served if I didn't appear.

field of business applications of mini computers, grew a company which is called Mini-Data Services, Inc., which was founded in October of 1969.

Q Is that still --

THE COURT: What was the name of it again, Mr. Highleyman?

THE WITNESS: Mini-Data Services, Inc.

Q Is Mini-Data Services still in existence, a going company?

A Yes.

Q What sort of business are Sombers Associates and Mini engaged in?

A Two different businesses. Mini-Data Services is a classic data processing service bureau which specializes in providing services to very small businesses through the use of its mini computer technology. It provides payrolls and receivables and similar functions, very low cost, very small companies.

Sombers Associates is involved, generally, in systems design and programming of mini computer systems of a wide range, ranging from business systems as with Mini Data as to process control systems and data entry systems. The entire range, really, of mini computer applications.

Q You've been using this term "mini computer."

What do you mean by it?

A Mini computer really has all the characteristics of a large computer. It in fact has pretty much the capabilities that larger computers have. It's just that it's physically very much smaller and much less expensive than the larger computers, partly because of its architecture, partly because of its use of advanced technology.

Q Have computers generally gotten smaller in size over the past fifteen years or so?

A Very much so.

Q Has there been any particular development that resulted in this decrease in size of computers?

A Well, the first significant development that resulted in the decrease in size of computers was of course the transistor, which is a fraction of the size of a vacuum tube.

Q Any others?

A Yes, in the past few years, the solid state technology had grown to a point where people were able to make not just one transistor or substrate on a semiconductor chip, but many many transistors. This has led to a device called an integrated circuit in which, in a volume roughly comparable to a transistor, people were building complete transistor circuits containing tens and maybe a hundred

transistors, and then this has further progressed to a technology known as large staff scale integration where, on chips, maybe a quarter of an inch square or so, entire computers made up of thousands of transistors are fabricated.

Q Do you have any specimens showing what the nature of these components you're talking about are?

A Yes, I have here (indicating).

MR. ISNER: Can we mark as Defendants' Exhibit BI?

THE CLERK: So marked as Defendants' Exhibit BI for identification.

xxx (So marked.)

Q The item produced by the witness, I show, Mr. Highleyman, can you tell us what Exhibit BI is?

A BI is a typical printed circuit card containing transistor circuits, though I don't know specifically what circuits are on this particular card. It carries a label M517. It's similar to cards I used and for instance, a card the size with roughly this number of transistors, the transistor being the black cylindrical items mounted on the card, might typically contain two flip-flops. The Court has already heard quite a bit about that.

As a point of interest, a card with two flip-flops like this costs about $100 and the flip-flops are

capable of megacycle operation; that is, they could be switched about a million times a second.

Q What time period is --

A This is back in the early 1960's.

Q What other units, what other type of elements are mounted on this exhibit other than transistors?

A Other discreet components necessary to make the transistor circuits work such as on this particular card, resistors, capacitors and diodes.

Q Can you point out or identify the diodes there?

A Yes, if you look at this card, you'll see two types of cylindrical objects, a large one with color-coated bands which are resistors and smaller cylindrical objects about half the size, also color-coated, which are the semiconductor diodes (indicating).

Q What are the wafer-like objects that are orange in color?

A Those are capacitors.

MR. ISNER: I will offer Exhibit BI at this time,your Honor.

MR. YUTER: No objection.

THE CLERK: Now, BI in evidence.

(So marked.)

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MR. ISNER: Would you please mark as Defendants' Exhibit BJ --

THE COURT: Just a moment, please.

MR. ISNER: -- another object produced by the witness, in the form of a small rectangular box having a number of wires coming out of it, generally U-shaped.

THE CLERK: So marked Defendants' BJ for Identification.

(So marked.)

BY MR. ISNER:

Q Mr. Highleyman, what is the unit that --

THE COURT: May I ask one question?

MR. ISNER: Excuse me.

THE COURT: Are the stripes at the foot of the Exhibit BI, are those the contact points?

THE WITNESS: Yes, your Honor. Typically there would be a range of what we call slots --

THE COURT: Similar to the ones we've seen but on a larger scale.

THE WITNESS: Yes. Those would plug right into the slots and contacts would be made to those gold-plated contacts.

THE COURT: Some or all of the gold-plated contacts depending on the extent to which you were

going to exploit every circuit means that are therefore opened.

THE WITNESS: That's correct.

THE COURT: All right.

BY MR. ISNER:

Q Mr. Highleyman, what is the unit that you have produced and marked -- and we have had now marked as Defendants' Exhibit BJ?

A This is an example of an integrated circuit that I just described.

A unit like this, again, might typically contain two flipflops and in its logic complexity was equivalent to the printed circuit board that we just discussed.

Integrated circuits become technically and economically feasible, I suppose, in the later 1960s, and again for economic and speed comparison, where as the card with two flipflops might have cost $100, this little chip, doing the same function, cost about $2.

Whereas the flipflops in the discrete transistor case were capable of megacycle operation, chips like this are -- the flipflops are capable of 50 megacycle operation or so.

In other words, each flipflop could be switched about 50,000,000 times a second. So it was a couple of

3 Highleyman - direct

orders magnitude faster and less expensive than discrete technology.

THE COURT: How many times did you say?

THE WITNESS: Approximately 50,000,000 times per second, your Honor, which gets us into a whole new speed range.

You have heard about milli-seconds and micro-seconds and we now talk about nano-seconds, n-a-n-o, which is a --

THE COURT: Is that n-a-n-o?

THE WITNESS: Yes. The next level I suppose for five years from now would be pico-seconds.

BY MR. ISNER:

Q Which is what?

Which is a trillionth of a second.

THE COURT: What was that final number that you got, the googalog or something?

It was named at the suggestion of the mathematician's small child.

THE WITNESS: I recall the name, your Honor. I can't recall --

THE COURT: I can't remember it. I get it confused with the Australian tennis player.

MR. ISNER: I will offer Defendants' Exhibit BJ

at this time.

MR. YUTER: No objection.

THE CLERK: Now, Defendants' BJ in Evidence.

(So marked.)

BY MR. ISNER:

Q Did I understand your testimony that they have even gone smaller now than Exhibit BJ, or coming to it?

A Yes. There is an area of technology known as large scale integration, which has produced a device known today commonly as a micro-processor.

This micro-processor is an entire computer on a chip, so to speak. In physical form it is maybe about four times as large as the integrated circuit chip we just looked at, but its size is not because of the size of the semi-condutor but is only that large because it needs something in the order of 40 pins to connect it. So the size is determined by the interconnecting pins and not by the semiconductor.

A typical micro-processor might be a square of semi-conductor anywhere from a quarter inch to a half inch in size, which could contain thousands or in some cases perhaps even tends of thousands of transistors in the equivalence of resistors and the other discrete components all in that half inch square chip.

Q Are these being used today in a particular application?

A In very high volume. You probably noticed the whole new product line of electronic calculators for -- now under $40, I believe, and these are all based on the micro-processor technology. They all contain a micro-processor of some sort or another.

Q Are these these little pocket computers you are talking about?

A Yes, that's correct.

Q Let's go back a little bit in time. What was the nature of the business of Data Trends?

A Data Trends was a system house, at least back in those days, and it made its living, so to speak by putting together special systems for customers, special computer based systems.

Typically, reel time systems, almost exclusively reel time systems.

Q You are using this word systems. Can you give us a definition of it in your terms?

A Yes. A system would be a complement of equipment, and in the particular way in which I'm using it, including one or more computers, interconnected together and suitably programmed to perform some specified function.

Q I believe you stated that you were technical director of Data Trends and then later a corporate officer?

A That's correct.

Q What responsibilities did you have as technical director of Data Trends?

A I was responsible for all of the design and development and in general all of the technical activities that were carried on by the company.

Q I think you also used the words "real time," or "real time computers," or something like that, before.

What did you mean by that?

A Well, there have been some good definitions of real time given so far in this case, and -- including one by the Judge, which I particularly like, but in general, a real time system is one which, let's say, serves a number of users in such a way that each user feels that he has the entire system all to himself.

The other users are transparent to him.

(Continued on next page.)

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DIRECT EXAMINATION

BY MR. ISNER: (Cont.)

Q As you have been using the term now, computer and data processor, are they essentially synonymous in your view, or as you have been using them?

A Yes.

Q Could you give us some specific examples of jobs that you were engaged in while at Data Trends, or that the company was engaged in?

A Yes. The first piece -- the first systems job, in terms of implementing hardware, that the company got was from UNIVAC and that was to build a communications front end to handle up to 256 communication lines connecting these -- by communication lines I mean dialed network telephone lines to be connected to the computer.

Q You say front end, what do you mean by front end?

A Yes.

By front end I really mean a piece of interfacing equipment that would take a number of these communication lines and allow them to communicate with the computer simultaneously.

This front end was in fact a scanner which scanned the various communication lines at very high speed

relative to the data on the lines, and in an orderly manner shuttled data back and forth between the computer and the communication lines.

Q Do I understand this now, that this was a system or an interface, as you call it, to feed data from a number of sources into a computer?

A Yes, that's correct.

Q By telephone wires or the like?

A In this case, by telephone wires.

Q Any other jobs you did?

A Yes. We billed a remote terminal for Honeywell, which effectively was a batch data entry terminal that would accumulate data in an insurance office, specifically for Metropolitan Life, during the day and then could be called up by the computer at night.

It would transmit the data which it had accumulated during the day to the computer and the computer could respond with various reports.

Following that contract the next contract in sequence -- significant contract received by the company was for the totalisator systems we delivered to NYRA.

Q Let's pass that one for a moment and we will come back to it. Any other projects that Data Trends was involved in over the period you were there?

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A Yes. We then installed a duplex computer system, using mini computers, at the Chicago Board of Trade in Chicago, to implement a floor trading system. This system was connected to terminals on the trading floor used by the reporters and as trades were made reporters would enter information into a terminal and it would be immediately routed to large display boards on the floor and to the Board of Trades nationwide ticker, and to television displays throughout the Chicago Loop area.

We then built a very large communications system based on a network of cuplex computers for ITT World Communications to handle their international telex traffic passing through the United States.

These were essentially circuit switching systems for telex traffic.

Q Telex being what, that's --

A Telex is a teletype writer-type traffic where users can,with a teletype type of machine can call up somebody else in another country or in another location by just typing in their teletype number, if you will, their telex number --

THE COURT: I take it by your standards, that is stone age stuff.

THE WITNESS: That is perhaps stone age stuff

technically, your Honor, but with the price of those contracts that was very modern work.

Q Let's go back to the unit now at NYRA, to the totalisator. What was your area of responsibility with respect to that NYRA unit?

A I was responsible for the entire design, development and installation of the NYRA Totalisator system.

Q How did Data Trends become connected with such a project?

A In the course of our work with Honeywell, we were approached by Honeywell and asked if we would like to support Automatic Totalisator in their bid for totalisator system, and we, of course, said yes, and Honeywell then put us in touch with Automatic Totalisator.

THE COURT: With whom?

THE WITNESS: Automatic Tote.

THE COURT: I see.

BY MR. ESNER:

Q Was the use of any Honeywell computers a requirement for the system at that time, when you were brought into it?

A Yes, since we were introduced by Honeywell, it was a precondition, if you will, that we would use Honeywell computers in this totalisator system.

So our job was to design this tote system using the Honeywell H-200 computers.

THE COURT: Which call number was that?

THE WITNESS: H-200.

Q Were there any other equipment involved or circumscription at this time when you were brought into it?

A Yes, I guess you could break the system up into three major complements of equipment:

There were the Honeywell computers, there was the peripheral equipment, which were the ticket issuing machines and display boards, which would be furnished by Automatic Tote.

And then there was the interfacing equipment which had to be build to connect the ticket issuing machines and the display boards to the computer.

And that was one of the elements of Data Trends job, to build that interfacing equipment.

Q What was this Minneapolis Honeywell H-200 computer as of this time -- as of this period of time?

A It was a standard general purpose digital computer suited for a wide range of applications, ranging from business applications to real time applications.

(Continued next page.)

DIRECT EXAMINATION

BY MR. ISNER: (Cont.)

Q Were you aware at the time of this contact how a totalisator system functioned?

A Until I had this contact, I never even heard the word totalisator.

Q Where did you get your knowledge as to how a totalisator system functioned?

A Oh, Mr. Dodwell of Automatic Tote and two or three of his people spent several days at Data Trends describing how their current electro-mechanical -- their latest electro-mechanical totalisator operated and we then essentially designed the -- a computer version of this mechanical operation.

Q Were you present here in this courtroom when Mr. Fosse testified? I believe it was last week.

A Yes.

THE COURT: Fosse?

MR. ISNER: Fosse.

A Yes, I was.

Q Was the functioning of the totalisator system described to you by Mr. Dodwell generally similar to the system Mr. Fosse testified to in this courtroom earlier?

A Yes.

Q Just how was the design of this NYRA system affected by Data Trends? By you, I guess.

A Well, after spending time with Mr. Dodwell, and his people, perhaps two or three days, Data Trends -- in fact, I specifically did the general systems design of the system enough so that we could prepare a quotation.

There was no detailed design of any kind at this point. Once the contract was awarded, people reporting to me prepared a detailed functional specification which we called the system operation specification or SOS, which I believe is an exhibit already.

Then, based on that specification, which I participated in heavily, I then personally did all of the hardware design for the interfacing equipment and I wrote the software specifications for the program to be implemented.

The specifications were then turned over to a programming group which reported to me, for implementation and I directly supervised in those -- and personally involved in the testing of the -- in the construction and testing of the hardware elements of the system.

Q As I understand it, there was a hardware set of components or portion and a software set of components?

A That's correct.

Q All right.

Q All right.

Now, could you just tell us just what is hardware and software, as you've used these terms in your previous answer?

A Well, the hardware elements of course were the physical elements of the system, in terms of the -- of the elements, the Data Trends was responsible for designing included the scanning equipment and the display board control interfacing equipment.

The software, of course, were programs written for the computer. The computer itself being a hardware element of the system.

Q Excuse me.

What was the last part you said?

(Record read.)

Q What is in the -- what do you have in the computer that makes it part of the hardware for the system?

A Well, the computer of course is a system element, is -- comprises its hardware elements and its software elements in order to do its function.

The hardware of the computer very generally break down into two primary components: There are the -- the memory component, which is a device for storing data which can be used by the computer and also for storing the

instructions which guide the computer in the task that it is to do.

The logic elements of the computer are -- are hardware elements which essentially extract information, extract instructions from the memory of the computer, execute those instructions, using data which is also stored in the memory of the computer.

Q What sort of --

THE COURT: Could you read that sentence to me, please, the one about the component of the hardware.

(Record read.)

Q What sort of instructions now are we talking about here?

A Well, the instructions available to the programmer or programs of a system as executed by the logic elements of the hardware, you might think as a breaking down into three major catagories:

There are manipulative, data manipulative instructions which in fact manipulate data such as arithmetic instructions; add, subtract, multiply, divide.

THE COURT: Just a minute.

Yes?

A There are a second of -- class of instructions,

instructions are necessarily executed ~~simultaneously~~ sequentially.

The computer is not capable of doing more than one instruction at a time. The entire set of logical elements is devoted to executing the particular instruction at hand before it goes ahead. There are more complex computers which can do some elements of parallel operation, but these are not commonly known computers.

Q All right.

Now, I believe you said before something to the effect that Automatic Totalisator was going to be responsible for peripheral equipment or some name like that? What exactly was involved?

A By Automatic Totalisator?

Q Yes.

What was going to be supplied by Automatic Totalisator for the NYRA installation as I think you said, peripheral equipment?

A Yes, generally, peripheral equipment, that equipment which existed around the periphery of the computer, if you will. Automatic Tote was supplying primarily the ticket issuing machines.

Some five to six hundred of them. And the various display boards, including the units for the large infield displays. Various smaller displays located around

plug it into a Honeywell H-200 computer.

They are just different devices. The job of the interfacing equipment was to allow that connection in an orderly and proper sense. Now, the -- the design of the interfacing equipment is by and large a logic design and specifically in the case of the NYRA system, and in fact all of the systems that Data Trends designed, were done with standard logic modules, such as the transistor printed circuit card here which has just been entered into evidence.

Q You are referring to this Exhibit BI?

A To exhibit -- yes, to Exhibit BI. These particular cards being manufactured by the Digital Equipment Corporation.

And these cards perform the standard logic functions of "and" gates, "or" gates, inverters, flipflops, delays and so on.

It was the -- so it was the function of the logic designer whose role I played in this project to design a device such as a TIM scanner using the standard logic modules, plugging them in and interwiring them in an appropriate way to do the required task.

It's kind of like putting tinker toys together.

Q Like what?

A Like putting tinker toys together.

DIRECT EXAMINATION

BY MR. ISNER (Cont'd):

Q Mr. Highleyman, will you give us or tell us the nature of the signals at -- at whatever appropriate location within the Weida patent structre that you deem proper, in response to the Judge's earlier questions?

A Yes. Unless you object, your Honor, I would like to do this by starting back with fundamentals and Mr. Weida has testified earlier how a Core Memory works but for purposes of this discussion, I would like to go back to that step and reduce a Core Memory and build the system up, in fact, in three different stages from that viewpoint, to give what I consider to be -- to result in what I consider to be a fairly simple but expository diagram of the signal flow through the entire Weida patent.

As you are already well aware, the memory in a Core Memory is made up of little toroidal cores of magnetic material, which can be magnetized in one director or another, i.e., clockwise or counter-clockwise so that each core can store one bit of information.

I'd like to discuss that physical setting of the core in some detail.

In electromagnetic theory, there is a rule known as the left-hand screw rule. If I may, we'll start

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with that rule and that simply says that if you take your left hand and curl it in this way (indicating), the thumb and let the thumb represent a direction of current flow through a wire, that the curl of the fingers will represent the direction of the nagnetic field that surround that wire as a result of the current passing through the wire.

Now, on this core, let me draw a wiare passing through the core. Though I have to draw it in the plane of the paper, we can think of this wire as going from the top of the paper through the core and exiting from the other side of the paper.

Let me draw an arrow on one side of this wire and label that arrrow A. Using the left hand screw rule, we will see that the -- that the direction of current flowing in the directed indicated by the arrow A which is in fact through the core from the top of the paper to the bottom of the paper, will cause a magnetic flux to be generated, which is counter-clockwise. Thus, magnetizing the core in a counter-clockwise direction.

Likewise, if we pass current in the other direction, as indicated by an arrow in the opposite direction which I will label B, we see that the -- and in effect this is causing current to pass from behind the pad through the core above the pad, that this will then, using that rule,

cause flux to be generated in a clockwise direction.

I'll show by an arrow which I call B, and thus by sending a pulse of current, a very short pulse of current through that wire, in one direction or another, the core will be magnetized correspondingly in one direction or another. Thus remembering the direction of that pulse and consequently remembering a signal bit of information, binary zero or binary one.

Now, this magnetic material in the core has a very special property which is called a square loop property of the magnetic material. I would like to plot a graph in which the abssissaor the horizontal access, I will label "I", to represent the current flow in the wire and the ordinant or the vertical part of the graph I will label "M" to reprsent the magnetization of the core, and either the current or the magnetization can be positive or negative.

In the case of the current representing current flowing through the pad from the top or through the pad from the bottom, in the case of magnetization the corresponding counter-clockwise or clockwise magnetization of the care.

Now, let us assume that the core is initially magnetized in its "A" state, which I will define arbitrarily as being positive magnetization and that there is no current flowing through the wire. This would be represented by a

point on the graph, as I have shown here, labeled point "A" corresponding to the A"A type of magnetization and this was caused by some previous pulse of positive current flowing through the core.

(Continued on next page.)

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THE WITNESS: (Continuing) If I now come again and send a positive current through the core, we would find that the magnetization in the core does not change. In fact, increase a little bit, but I am not going to show that on the diagram.

As we increase the positive current, the degree of magnetization in the core remains the same. In fact, is magnetically saturated. It cannot be magnetized any more, and if I should, on the other hand, increase current in the negative direction through the wire, we would find that the magnetization would still remain the same, until we suddenly got to some critical current, at which point the magnetization would flip suddenly down to its B level of magnetization, which I will represent as B on the chart.

And then continue in the -- the B level of magnetization being saturated, at this point magnetically, as the current became more and more negative.

I then return that current to zero. The magnetization will remain in its negative state. Then at some later time, if I put a pulse of positive current in, we would find it would stay negative until it reaches some critical current, at which point it would suddenly switch to positive again.

You notice this diagram is similar to a square and this is why we call this kind of magnetic material a square loop material.

This has a very important consequence in core memories, because it says that we can partially switch a core by putting through a positive -- a positive current or a negative current of magnitude represented by the dash lines I am now drawing. As long as we stay within that range, we will not in fact switch the core.

But if in fact we put twice that amount of current, as represented by the small access on the abcissai I have just drawn, we will in fact select the core.

So that I could, for instance, put a second wire through the core, which I have shown, and not labeled because I think at this point the label is not necessary, and if I limit the current on each wire to just this half select current, which I will label on the graph as small i and small negative i, and send this half select current through either wire, I cannot switch this core. The core will -- will simply remain in its current magnetic state.

However, if I put this half select current on

both of these select wires, both in the same direction at the same time, the sum of the currents will be enough to switch the core.

So therefore, we can only switch the core if we have the coincidence of current on both of the select wires. I will label these wires "select wires."

And therefore, the generic names of these memories as coincident current memories. A memory position is -- is actuated only upon the coincidence of two wires.

MR. ISNER: Let's mark that, please, as an exhibit. That's Defendant's Exhibit BN.

THE CLERK: So marked.

(Chart so marked for Identification.)

THE WITNESS: That's BN.

Now let's talk about the integration of this simple little magnetic core circuit into a memory. We have talked about how we could magnetize this core in one direction or another, but we must also have some way to sense which direction that core is magnetized in in order for that data to be useful to us.

And the converse of the left hand school rule also holds, that says that if I change magnetic flux in the direction of my thumb, I can generate in a

surrounding wire around that magnetic current in the direction of my curved fingers, and so if I in fact curve a wire around this core, and let's call this the fense winding of the core, any change in the magnetic flux of the core will cause a corresponding pulse of current to be induced into the fence winding.

So that, for instance, we could determine -- let us arbitrarily define the A state as a binary one state and the B state as a binary zero state. It's quite arbitrary.

We could determine and in fact in core memory technology we do determine the state of a particular core by selecting it and driving it into the binary zero state, by sending current on both of the select wires through in the negative direction, thus trying to force it into the B state.

If it were already in the B state, there would be no change in magnetic flux and we would get nothing out of the sense wire.

But if there were a -- if the binary core had been initially set into the one state, this would cause it to be driven to the zero state, magnetic flux would switch in the opposite direction in the core and we will get a pulse out on the sense winding

which might look something like the diagram I have drawn here and I have indicated a binary zero and binary one type of signals on the sense winding.

You will note that in order to determine the content of that particular core, we have had to destroy the --

THE COURT: Just a minute.

Yes?

THE WITNESS: You will note that in order to determine the information content of that core, we have had to destroy the information that was in there, since once we have read out the information that core will always be set to its zero state and we have no way of knowing what was in there.

And this gives rise to the term we may have heard, destructive readout. This is a destructive readout, coincident current memory, made up of square loop material magnetic cores.

THE COURT: Leaving the core memory at?

THE WITNESS: Its zero state. In other words, in order to determine what had been in that core, we have driven it to its zero state and seen whether that caused a change of magnetization or not.

We now must capture this information from the

sense windings in some other memory, typically a flip-flop memory, and we have the data there but we have set this core and any other cores that we have selected all to zero. The data is no longer in memory. It's outside. It's as if this were a true pigeonhole in a big box of pigeonholes with a piece of paper in it and we have taken a piece of paper containing the information out, holding it ourselves leaving the pigeonhole empty. Later on we might write some more information and stick it back in the pigeonhole.

How do we write data back into that core, which, unfortunately, is not done in the obvious way of simply sending a positive or negative current through the select wires? It is done in the following way.

In order to write current into this core, we will also send a positive half select current over both select wires, which would normally also select that core.

However, in addition, we have one additional wire which threads this core and I am going to show this wire as coming through the opposite direction and I apologize for the drawing becoming more cluttered.

I am going to call this the inhibit wire, because its purpose is in fact to inhibit switching of

that core.

When we want to write data into the core, we will energize in a positive direction both select wires. Thus, trying to drive the core into its one state.

I assume that we start out with the core in the zero state because we have just read data out.

However, if we -- and if we want to write a one into the core, that is all we do.

However, if we want to write a zero into the core, we in addition send a similar half select pulse through the inhibit wire, which is traveling through the core or at least as shown here will cause a current pulse of the opposite direction from the select wires, thus cancelling out one of the select wire currents, making that core only half selected instead of fully selected.

Therefore, not allowing it to switch from the zero state, and so in effect what we do if we want to write a bit pattern into a series of cores, we will try to drive all of them one, to ones, but we'll put the binary complement of the data that we want to write onto the inhibit wires.

Wherever we want to write a zero, we will

energize that inhibit wire, as preventing those cores from switching and in this way write our data back into the core.

Q Do you need a new sheet of paper, Mr. Highleyman?

A Yes.

MR. ISNER: Let's, as a precaution, mark the next sheet as a new exhibit number. That's marked as -- the new sheet on which Dr. Highleyman is going to write as Defendant's Exhibit BO.

THE CLERK: So marked.

(Sheet so marked for Identification.)

THE COURT: Have you offered BN? Without objection?

MR. ISNER: I was going to offer them together after he finishes.

However, I'll offer it now. I offer BN.

MR. YUTER: No objection.

THE CLERK: Defendant's Exhibit BN now in Evidence.

(So marked.)

THE WITNESS: I hope it is not too late to add one more minor thing.

I would just like to label the select wires in

the industry standard way, X and Y. So that we have our two select wires, X and Y, our inhibit wire and our sense winding.

Now, in order to build a useful memory out of this simple little device, we in fact arrange a multiplicity of cores in some sort of an array and in fact thread these cores with these four wires.

If you look at a core memory, you would see tiny little cores with these very fine little wires running through all of the cores, and let's talk about now the particular kind of array which is typically used, which Mr. Weida has already discussed very well in some detail, but I want to present in just a little different way.

Typically take a three-dimensional arrangement of cores. My solid geometry is not always that good. The -- this represents -- is intended to represent a three-dimensional cube with a couple of rectangular solids appended to the sides here, and the cube here is a three-dimensional array of these triodal cores and let us say that there are -- that the array is X cores across and Y cores high and Z cores deep, just to avoid using specific numbers at this point.

As Mr. Weida pointed out, this might typically

be an array of 64 by 64 cores where X and Y is equal to 64 and 25 cores deep for each set of Z -- each set of cores along a Z axis might represent a word, so I am not going to limit myself to those particular numbers.

Now, the rectangular solids that I have shown on the plane XZ and on the plane YZ are my driver electronics, which are capable of driving these high speed powerful current pulses through the cores.

And let's call this upper rectangular solid the X drivers and the one on the side the Y drivers.

Now, the X drivers are typically capable of sending a current to all the cores in a particular YZ plane, if you will.

In other words, if I show a terminal -- several terminals on the XY drivers and dash lines across the XY drivers, as I am here, if I energize terminal No. 2, let us say, that will take all the cores in the vertical plane extending into the paper and energize all of those cores in that one particular plane, the number of cores being Y times Z.

Whatever that is, it will send a select pulse or a half select pulse to each and every core in that plane.

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Likewise, the Y driver will do the same in the plane XZ, cutting across horizontally through the solid, and will energize all of the cores in some particular plane that is a horizontal plane here.

Let us say that I put a pulse simultaneously on driver No. 2 of the exit drives, as I have indicated by a big arrow here. On driver No. 3 of the Y drivers.

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(Continued on next page.)

THE WITNESS: Then I would send a half select current pulse through -- over the course in the number two plane, if you will, in the number 2YZ plane, and I will send a half select pulse through all cores in the number 3 horizontal plane, and that will be a half select pulse. But those particular cores that are on the intersection of these two planes will all have a double selection pulse going through and those cores will be the only cores that are selected.

I am trying to indicate on the diagram here a line of cores extending back to the memory, which will all have double select currents through it. These cores will all be selected.

As we have already discussed, selecting means, we will switch all of these cores, or attempt to switch them all into the zero state. Each of these cores has its sense winding. It will cause the data stored in these cores, being Z in number, such as 25, to be read out of the memory where we can then capture that data and do something with it.

Typically, in the Y system, what we do with it is to send it through some transistor logic called an updater, such as UAA, which will add the number 1 to

whatever binary value is represented in that register, and will take the resultant number and through the right process in the inhibit lines, which we have laready discussed, will cause that new incremented number to be written back into that same set of cores.

So for instance, if the number 134 in binary form had been read out of the memory here it would go back in as 135 in binary form; it would be incremented by one.

A distinction I want to make is the following: There are really three signals associated with this memory: there is an X address selection signal, which is really a one out of n type of signal, out of the X possible wires coming into the X drivers only one is energized and that selects all the cores corresponding to an X coefficient in this memory.

Secondly, there is a Y address which simply is a one out of n signal, selecting one of the various bi-planes; and, thirdly, there is the data signal which comes out of the memory and which is returned to the memory, which is a general binary number of some form, and could be representative of any type of information. In the Weida patent it is specifically a binary count, it represents a number of tickets

sold, and will always specifically be incremented by one, so that this data signal can be any combination of bits. And it specifically represents a real number.

Before proceeding to the third and last diagram, let me just set up a simple example where, let us set X equal to 12, specifically, so that we have 12 different X planes, and let us set Y equal to 400 so that we have 400 Y planes, and then think about designing a system wherein we let X be a horse number and Y be a TIM number.

We can then send this memory, a one out of n signal representing the horse, and one out of n signal representing the TIM, then a signal array of 25 cores, let us let Z equal 25, will be selected, which represents a specific horse selection for a specific ticket issuing machine.

We can use that then as a counter to accumulate the number of ticket sold by that ticket issuing machine for that particular horse and use the array of addressable words in this memory to represent the number of tickets sold on each horse by each ticket issuing machine in the entire system.

This in fact is the basis, as I understand it,

of the aggregator in the Weida patent.

Now, just as a side note, I note that in the patent description, the patent describes the memory being used in this way specifically. Mr. Weida also testified that the memory blocks that he used were in arrays -- they were 25 cores deep, they were in arrays of 64 by 64 which does not fit this pattern, which implies that there was some additional modification of these X and Y addresses within the memory itself, so that somehow we could fit this 12 by 400 array into several 64 by 64 arrays. That particularly is not disclosed in the patent, but functionally the memories are used in this way.

MR. ISNER: Let me offer this before we go on.

I would like to offer exhibit BO at this time, your Honor.

MR. YUTER: No objection.

THE CLERK: Defendant's Exhibit BO now in evidence.

(So marked.)

THE WITNESS: Now, let us then represent the Weida patent in a very simplified manner, but a manner which will be, I believe, structural and not necessarily just functional.

Let me start by drawing the memory at the bottom of this page. I will label it memory, and I will show via a wide arrow here a group of wires coming into the X side of the memory, which I will label one of 12, representing the particular selection of 12 horses, and into the Y side of the memory via a similar arrow I will label it one of 400, which represents the number of ticket issuing machines, and this will be a one out of n signal representing the horse and the ticket issuing machine to select a TIM location in memory to add the ticket count to.

At the top of the page I will indicate a plurality of TIM's by showing TIM-1 to TIM-n. The data signal from each TIM is in fact a one of 12 signal, as I have indicated with the broad arrows, coming out of the TIM, there are 12 wires and only one of those wires will be energized, representing the selected entry.

These signals are fed into a buffer, which is simply a very large OR circuit which combines all of the data from the various TIM's into a common data bus, just a single data bus.

So coming out of the buffer is a single one of 12 signal, which I have indicated with a broad arrow.

This particular data signal is fed into what I might say is the primary subject of the Weida patent, which is his error checking circuits, which makes various tests on this one out of 12 signal to determine if there has been any hardware fault in the signal causing a variety of errors, as we have discussed, to determine if it is a hardware-valid signal, if in fact the transaction is on a scratched horse, and so on.

It determines in general -- this is the transaction processor. It determines that this transaction is valid. If the transaction is not valid it will return a reject signal to the TIM's. If the transaction is valid it will transmit that one out of 12 signal to the memory for aggregation. Simultaneously, there is a scanner here which has been involved in selecting the particular TIM. The output of a scanner is a binary count, a pure binary count in which all possible combinations of the bids coming out of the scanner, at least out of the maximum scan count up here, this binary count is sent to two particular devices, both of which are similar in their construction -- let me call this scanner counter SKA, I believe it is. It goes to a device called the scanner, which is

in fact a decoder, SCA, and out of SCA comes a one of 400 signal, one out of n signal -- I am assuming that there are 400 TIM's in the system -- and this one of 400 signals selects one of the TIM's.

Likewise, using the same binary count, a decoder, DEC, generates a one out of 400 signal which is sent to the memory, the Y axis of the memory, to identify the particular -- I should say the functional Y axis of the memory to identify the particular TIM at which the ticket has been sold.

Once the aggregation of the memory has been completed an acknowledgment signal is returned to the connected ticket issuing machines. So that in effect data is represented throughout the Weida patent substantially in four different forms, you might say:

Very specifically, the selection data is carried throughout the system on a one out of 12 code, passing through the error-checking circuits, being terminated at the error-checking circuits if it is improper, but otherwise being passed directly on to the memory in unchanged form.

The ticket issuing machine identification is represented both in binary form as the output of the scanner counter, and it is in one out of 400 form in

selecting the TIM or selecting the memory address to be undated.

The data within the memory here is also in binary count form and, finally, the acknowledge and reject signal and certain other internal signals are in binary state form, if you will; they are in single wires which are transmitted back to the TIM.

This I believe is a fairly accurate representation of the way data is shuffled around, and the form in which it is shuffled around in the Weida patents.

(Continued next page)

to claim element 26-B.

Q Were you present in this Courtroom when Mr. Fosse testified?

A Yes, I was.

Q All right.

MR. ISNER: Will you please mark as Defendants' Exhibit BT a copy of a schematic functional block diagram marked Amtote.

THE CLERK: So marked.

(So marked.)

BY MR. ISNER:

Q Mr. Highleyman, I return to you Exhibit BT and ask you if you had prepared this exhibit?

A Yes, I have.

Q Will you tell us what it is, please?

A Yes. This is a representation of the American Totalisator system described by Mr. Fosse in terms of the functional representations similar to those already presented for the Weida patent system and for Handley.

It shows at the top of the drawing the ticket issuing machine labeled TIM in the American Tote system. This ticket issuing machine, once it has been set up with the -- by the depression of the appropriate transaction selection switches, will generate a bid signal to the totalisator

which, in the Amtote system, would energize one of the appropriate S relays, and would subsequently receive a connect signal from the scanner in that system via one of the collector relays generally labeled C in Mr. Fosse's diagram. And this would cause the ticket issuing machine to place its data on the data bus.

Once the totalisator had processed that data --

Q Before you go on, what is the data bus in that system?

A The data in the Fosse system, as I recall, was a common data bus, to which all the ticket issuing machines connected.

Q Go ahead, continue.

A Once the totalisator system had processed the transaction, it would return an acknowledgment signal if the ticket were to be issued, or a reject signal if the ticket weren't to be issued and the keys were simply to be released.

The data from the TIM is passed into a data collector, which, in the case of Amtote, comprised primarily the scanner, or, as Mr. Fosse referred to it, his Jumping Jack collector, which sequentially scanned the ticket issuing machines looking for active bids, and once it found an active bid would stop on that ticket issuing machine and return a connect signal to that TIM.

If the Court will recall, the scanner in that particular case was a relay type scanner, which scanned the TIMS.

Q Would it help you to have Defendants' Exhibit AA, which Mr. Fosse was testifying about?

A Yes, it might, Mr. Isner.

Q Here it is.

A Even better, Mr. Isner, I believe that I had an annotated drawing, which is probably in my file in my briefcase on the desk which would be a help.

Q Be my guest, go over and get it.

THE COURT: You mean something like this (indicating)?

THE WITNESS: That looks like that would do the job.

Q Do you remember where you were?

A Yes, we were just in the data collector, I believe.

We were discussing the scanner, which would scan the bid lines, or, in fact, the S relays associated with the various ticket issuing machines, looking for a TIM with an active bid. Once it found the TIM with an active bid, it would stop on that TIM and return a connect signal via one of the collector relays generally labeled C in his

drawing.

This would cause the ticket issuing machine data to be transmitted to a transaction processor which functionally performed at least two tests, as described by Mr. Fosse, on the transaction data: It performed a dual entry test by the nature of the way the runner memories worked, those counters being called RAM's in his drawing, since in his system if more than one runner memory was addressed by a fault in the data, the splitting of the current to those memories would be such that neither memory would operate, thus preventing an acknowledgement signal from being returned through the totals memory to the ticket issuing machine.

This would in effect cause the totalisator system to halt and once the system fault had been corrected the totalisator would begin operating again and if that particular ticket issuing machine hadn't been caused to reject the ticket for manual operation, it would then be served in a normal manner.

Mr. Fosse's system also included a scrathing facility so that horses that are not in the race would be so indicated to the totalisator, thus preventing wagers on those horses from being processed.

The horses which are to be scratched are noted by opening a series of horse lockout keys called HLK on

his drawing --

THE COURT: I'm afraid I've lost you.

THE WITNESS: HLK, your Honor, is on the far left of the drawing, essentially they interrupt the betting control relays into the --

THE COURT: Oh, yes, I remember that now.

THE WITNESS: The circuit is so arranged that the setting of these keys is compared to the selected transaction in the -- as being presented by the ticket issuing machine, and if the transaction is on a horse which is not in this race, a reject signal is returned to the ticket issuing machine, which will result in the keys being released, the ticket issuing machine being reset, but with no ticket being sold.

The comparing means there is the circuitry involving the betting control relays BC, simply because the scratch switch HLK opens up the coil circuit for the betting control relays, thus preventing any wagering on that particular horse.

If the data is valid, that is, it is a bet on only one horse in the race, and that horse is in fact a runner in this race, then the data will be passed to the aggregators. The aggregator address is generated in the hardwiring of the Fosse system

by the way in which the data bus from the ticket issuing machines are connected to the runner memories.

THE COURT: To the --

THE WITNESS: The runner memories, the RAM's.

This wiring is such that a bet on a particular horse will pass to the runner memory for that particular horse and also to the totals memory, which he calls TAM's, for that particular pool.

THE COURT: Did he have a separate sketch for that?

THE WITNESS: No. I believe his separate sketch, your Honor was discussing the innards, if you will, of a memory, whether it was a runner memory or a totals memory, that had several of these stepping switches, and we had the problem of how do you add up the results of those stepping switches to get a total value stepping switches. That was his other detail drawing.

There was a simplified schematic which essentially represents this particular drawing that we are now looking at, Defendants' Exhibit AA.

Now, the return of a reject or an acknowledge signal to the ticket issuing machine caused the ticket issuing machine to go through its appropriate

cycle, thus releasing the scanner, or the Jumping Jack collector, to start searching for other ticket issuing machines with adequate bids for servicing.

In Mr. Fosse's system, there was an electronic calculator which operated off the results of the aggregations in the RAM's and TAM's, and periodically this calculator would take a snapshot of those particular totals and then make the odds and pools calculations for display to the general public.

Also, at the end of the race the same calculator, I believe, was given the order of finish in the race and made the various payoffs calculations for display to the public.

MR. ISNER: I will offer Exhibit BT at this time.

MR. YUTER: No objection.

THE COURT: Received.

THE CLERK: Defendants' Exhibit BT now received in evidence.

(So marked.)

fols.

(Continued on next page.)

NYRA system this is done completely by software. It's the responsibility to program in the computer to update these totals.

Q In the NYRA system does this valid runner checking means, as you have described it, and the runner totals updater, as you described it, exist simultaneously in the NYRA system?

A Well, in order for two items to exist simultaneously, that would mean that one would have to be able -- not only be able to observe and point out and delineate these items as separate entities existing at the same time, but a further test would be that they could -- if they existed simultaneously, that means they could operate simultaneously. Whether the system used simultaneous operation or not, at least it would be capable of operating simultaneously, and since in a computer system of the type used in the NYRA totalisator the computer was capable of only doing one function at a time, in fact it was capable of doing only one elemental instruction at a time, each function being composed of many, many elemental instructions, then the system could only be doing valid runner checking or could be doing runner totals updating, but there is no conceivable way in which it could be performing both of these functions at the same time. And since the two means could not possibly operate at the same time, therefore I would have to conclude that in no

Q On Page 1, I notice a reference to Hughes, Datatrend. Is that the Mr. Hughes whom you just referred to?

A Yes, he was president of Datatrends.

Q And Mr. Boa, what position did he then occupy?

A He was the managing director of Automatic Totalizator.

Q And is that Block, for Honeywell?

A Yes, Dick Block was vice -- was a vice-president at Honeywell.

Q Would you turn to Page 2, the last sentence in the top paragraph, which reads --

THE COURT: What page?

MR. YUTER: Page 2.

Q -- (continuing) -- "Mr. Walsh reiterated the fact that they would have to examine and test the completed portion of the entire system before the Tax Commission could give the approval," and then, "Mr. Boa then explained that the J-10 issuer sold to Roosevelt Raceway had been modified by the Westbury Electronics Corporation before being placed in service, but that in general our entire operation would be comparable to the Westbury Electronics, with the exception that the computer would be Honeywell 200 instead of the Digitronics tote."

Was Mr. Boa, in your view, telling the truth

with that statement?

A I'm sure Mr. Boa would -- would not tell a lie. And I was not at this meeting so I have no idea what happened.

I think it's clear what Mr. Boa was saying: first of all, somebody who had not been around computers and did not understand computer systems was -- well, in fact I see previous references to the State Tax Department would have to witness a test of the completed equipment. And based on the previous documents that you have just shown me, I would suppose that what Mr. Boa was trying to say was, "Well, that's OK, but we feel pretty confident because it appears that you approve the Westbury, and we are going to be doing a computer system like Westbury."

Mr. Boa -- and at that level --

THE COURT: I don't think he was rendering an opinion on infringement.

THE WITNESS: I certainly don't think he was rendering an opinion on infringement.

BY MR. YUTER:

Q But he was indicating confidence in the ability to build a NYRA 2, was he not?

A Certainly he was doing that, I'm sure. Confidence which we had inspired in him, I hope.

Also I guess that's also a reflection of my having moved from the engineering field to the software field, where they have yet to make octal and hexadecimal slide rules.

Yes, it looks as though that would be about 4,000 man days, also, which is about 15 man years.

Q Sorry?

A 4,000 man days, which would be about 16 man years, or 250 man days in a man year.

Q How many manhours?

A 4,000 -- 32,000 manhours. Something in the order of 30,000 manhours.

Q At what rate were they charging your time at that time?

A At that time I was being charged off I think at $350 a day. Somewhere between that and -- yes, about that.

Q Mr. Hughes?

A We didn't charge for his time. He came under G&A, in the mark-up.

Q Mr. Hires?

A He would have been charged off at about $250 a day.

Q What other professionals were on the project besides yourself and Mr. Hires?

Q And hardware was P. J. Gibson, and software was J. B. Myers. Then there is a senior engineering programmer to be filled by September 1.

Who did that turn out to be?

A I don't recall who filled that job in the beginning. I know by the end of the project -- and it may well have been the same man -- this function was performed by Mr. Harry Meinhold -- no, no, Mr. Marty Sheinberg.

Q Marty --

A Sheinberg.

Q What is that title, senior engineering programmer?

A That's a very good question. I don't know.

Q I mean, that's not someone just out of college, with a degree --

A Well, I shouldn't say. I can maybe try to answer why it was called a senior engineering programmer. I don't remember that term being used. This is new to me, although I'm sure I was exposed to it at the time.

But, in a system like this, the programming of a system which is embedded inside a real time system of this nature, is more than just writing a program. It's the person who is responsible for the design and implementation of these programs who must also understand thoroughly how

the hardware works, because there is a very important, complex and delicate balance between the hardware and the software. There are a lot of things that you could elect to do, either in hardware or in software.

The basic decisions of what was going to be done were -- were made by me, and were reflected in either my designs of hardware or my specifications for the software, but still it was very important for the person responsible for the software to understand these interrelationships, and that is probably why he was called an engineering programmer.

He should be a person, ideally, who is a trained and qualified engineer who has converted to being a programmer.

MR. YUTER: Miss Highland, would you please mark as Plaintiff Exhibit 166 for identification --

THE CLERK: So marked.

MR. YUTER: -- (continuing) -- a document P899 bearing the heading, "NYRA Automatic Tote System Progress Meeting," and the date, December 14, 1964.

Plaintiff offers Plaintiff Exhibit 166. Is there no objection?

THE CLERK: Plaintiff Exhibit 166 now in evidence.

serviced.

Q So we had a situation where we had an error, we didn't send back a reject signal; moreover we did more than that, we sent back an acknowledge signal, and we are printing a ticket on bets that were not made?

A This is one of those horrible cases that I suspect exist in every tote system, in which the Totalisator company owes the track that money. It's a common contract clause, I believe, in Tote contracts.

That, by the way, is the similar situation to that which was referenced in the letters you showed me earlier with respect to the NYRA system. We are talking about extra tickets being sold that weren't aggregated.

The NYRA system has faults in it that could cause the very same thing to happen. I don't know if that would be true in the Weida system or not.

Q Yes. Well, we are interested in what Hanley teaches, and as I understand if we go to Claim 20 and look at element C, which reads: "Transaction and calculating means for performing a calculation on said generator signals and transmitting an acknowledgement signal to said acknowledgement signal responsive means for issuing a ticket only if the transaction is correct."

And here -- I think you have agreed with me now that

we have Hanley issuing a ticket when the transaction was incorrect?

A Yes, I'm afraid Hanley does that. And according to the other documents you showed me earlier the NYRA system suffers the same kind of failures from time to time. So that it's not --

Q This is inherent in the logical design of Hanley, is it not?

A The NYRA problems were inherent in the logical design of the NYRA system.

Q And it was fixed?

A I don't know that. The last I heard these kinds of things still happened, and at least my understanding from the scuttlebutt is that these happen forever and ever in any Totalisator system, they are just things to be expected, and that's why they are covered in the Tote contract.

Q You are saying nine years after you installed the system it's issuing tickets --

A Oh, I didn't say that. I said --

Q (Continuing) -- on non-aggregated bets; is that what you're saying?

A What I said was I wouldn't be surprised if it were on occasion.

Q In any case Hanley does issue a ticket on an

CROSS-EXAMINATION

BY MR. YUTER: (Cont'd.)

Q So as I understand the system, you're going to aggregate no matter what, with 38 and we're going to aggregate no matter what, with 53. So we already have an error?

A That would be my interpretation.

Q Right. That can't be prevented. And now we're discuing which gets back to the TIM first. That green connection --

THE COURT: So that the relays we are concerned with in the green circuit now are --

MR. YUTER: It's just in Counter 39, those contacts will close. We believe right away.

THE COURT: How many relay elements are there in the counters?

MR. YUTER: They are shown as -- in Counter 39, your Honor, they are shown, for example, as No. 2 and No. 3.

THE COURT: In that kind of bet?

MR. YUTER: Right.

THE COURT: But they operate concurrently? Sequentially?

MR. YUTER: They operate in parallel. Simultaneously.

THE COURT: Yes?

MR. YUTER: Producing a minus voltage and a ground across the green pair.

THE COURT: Yes?

MR. YUTER: Which is sent instantly back -- well, to the TC relay in the TIM.

THE COURT: And what relays are there in the circuit that are hurdles in the race?

MR. YUTER: Okay. So we have the -- the race -- the race is between the orange --

THE COURT: The witness at this point --

THE WITNESS: I'm sorry.

THE COURT: How many hurdle relays on the acknowledgement line?

THE WITNESS: Two.

THE COURT: They are?

THE WITNESS: The solenoid in the counter with their associated switches.

THE COURT: Themselves?

THE WITNESS: Not really a relay but functionally we can look at them as that and the TC relay in the ticket issuing machine.

MR. YUTER: That's right. So, it's the green team against the original team in this race?

THE WITNESS: That's right. Green team has got two.

BY MR. YUTER:

Q And the original team?

A Has got four. I agree with Mr. Yuter, that there are four sequential elements in the operating team, which is the RG relay, the RL relay, the HU relay and the OP relay.

Q If you had to bet your money, Dr. Highleyman, would you put it on the green or the orange?

A I would sure put it on Mr. Handley because he was granted the patent and he says the orange team wins, I've got to believe him. And the reason for that is that I would suppose, that the counters are being a fairly large -- well, a mechanical element in which relatively large masses of mechanical motion must be accomplished compared to a relay, that they are enough slower than the relays so that this race is run by relatively small featherweights in this race versus the lumbering giants.

Q Are you suggesting then that where one had a choice of design to activate the check circuits contacts at the beginning of the incrementer or at the end, you would wait until the -- until the end of the actual incrementing, contrary to the Aqueduct electromechanical tote? So that

which was involved in the systems claims? Those are two separate entities?

"Answer: I don't remember getting any -- going into it any deeper than I've said so far."

Picking up now at the last line on Page 45.

"Question: What connection, if any, did you have with the prosecution of this application?

"Answer: I prosecuted it through to issue.

"Question: You prosecuted it?

"Answer: Yes.

"Question: At the time of this period, between --

"Answer: I know what you mean.

"Question: -- the end of January, until the application was filed, did Dr. Yuter go out to the client with you and assist in any way in the drafting of this application? Let's put it two ways. Did he ever go out to Digitronics with you concerning this subject?

"Answer: He could very well have.

(Continued reading by Mr. Isner of the Spiecens Deposition.)

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MR. ISNER: "Question: Do you have any memory of him going out there, positive?

"Answer: Specifically, no.

" Question: Did he cooperate or contribute in any way to the drafting of that application as it was filed? I mean, other than maybe checking the work you did? I'm not talking about that.

"Answer: I remember we spoke about it. Specifically what it had -- oh, it had to do with how to prepare the application. A lot of it had to do with how much to disclose and how much to disclose in the sense because we were running under a time limit.

"I remember it was the first time that I tried using Boolean indicatings to define logic operations instead of showing hardware. And I remember he and I spoke about at that time would it be an adequate disclosure. Today there is no question that it would be, but at that time there was a question and I remember we tried to get an opinion someplace.

"There may have been talk about how to cover the inventions, you know, whether my set of claims would be adequate.

"Question: Were they?

"Answer: I felt they were. Let's put it that way.

"Question: WEre the claims as filed, your work, your claims?

"Answer: Primarily, yes.

"Question: What do you mean by quote, primarily, close quote?

"Answer: He may have questioned some wording.

" "Question: You are talking about insignificant particulars?

"Answer: In details.

"Question: At any time during the prosecution was a search made to try to more particularly define the state of the art?

"Answer: By us?

"Question: Yes.

"Answer: No.

"Question: This opinion you tried to get, was that just on this adequacy of the disclosure subject matter?

"Answer: Yes.

"Question: And was that again in general because of the Italian thing you are talking about

record, I don't know if it's in the record, the fact that the defendants now have the demonstrator in their possession. They've had it for some time; is that correct?

MR. ISNER: No argument about that. It was found out in a storeroom at Roosevelt Raceway and we told Mr. --

THE COURT: I'm sorry.

MR. ISNER: It was found in a storeroom out at Roosevelt. Components, not the whole thing. It's down in Delaware and Mr. Yuter is invited to come down and see it. There has been no secret about this.

THE COURT: I think Mr. Yuter's point is that it is at least as good as the records or drawings.

MR. ISNER: I will contest the point. If you figure -- if anyone could ever go in with the circuit cards, it would take you a gargantuan job to try to figure out if all the circuit cards are there. We don't know. We have nothing to check it against.

Certainly what was at Roosevelt we have done there and anybody is welcome to look at it but tracing circuits through something like that size, with the

circuit cards, even assuming they are complete, is a super human job.

THE COURT: Does anyone know in the material that is now at Newark, how many cabinets there are?

MR. ISNER: The same thing that is shown in the drawings, your Honor.

I think there are -- if there are four cabinets in those Exhibit T drawings, those -- I think the four cabinets are down there, as I --

THE COURT: They look like the four cabinets.

MR. ISNER: Yes.

THE COURT: That you saw before? Does anybody know how many of those circuit cards are in there, did anyone count them?

MR. ISNER: No.

THE COURT: But it would be the numbere exhibited by the photographs in evidence here?

MR. ISNER: I can't even say that, your Honor. We just took it as it was.

THE COURT: Nobody opened the cabinet doors.

MR. ISNER: I didn't go down and look at it. We picked it up as it was at Roosevelt. That's all I can say.

MR. YUTER: All, my understanding, Mr. Isner, is that there were no drawings?

MR. ISNER: No.

THE COURT: All right. No drawings at Roosevelt Raceway?

MR. ISNER: No.

THE COURT: Or tucked in to it?

MR. ISNER: No. There were no drawings.

THE COURT: What I was thinking of was, frequently on small appliances, they will have a circuit diagram pasted inside a door or something of that sort.

MR. ISNER: No.

THE COURT: No circuit diagrams?

MR. ISNER: As far as I know --

THE COURT: Pasted anywhere on the equipment?

MR. ISNER: No. As far as I know, your Honor, no.

MR. YUTER: With the Hohmann ticket issuing machines also with it?

MR. ISNER: I saw them at Roosevelt. They're not down in Newark, though. They were not shipped for some reason.

THE COURT: They are still at Roosevelt?

MR. ISNER: No. I think -- I think American Tote has them, to be perfectly candid. They were

the ones that owned the stuff as it turned out later. They had bought -- well, they had bought the Westbury tote or -- I won't say bought it. They took title to the Westbury tote and all the related equipment so apparently they owned whatever this prototype or what was left of it and I was out there.

I saw it in the storeroom underneath Roosevelt Raceway at one time. We located it and the Hohmann machines or what I later found out to be the Hohmann machines were there.

When the time came to ship it down to Delaware, they were not shipped along with it. The Hohmann machines, I know, are in the possession of Amtote and if you want to look at them, we can probably get them. They look like the photographs.

THE COURT: In the possession of Amtote but not at their Roosevelt Raceway facility?

MR. ISNER: No. I think, as a matter of fact, I think they were brought up for possible use here and we decided not to do it. So -- they look just like the photographs.

MR. YUTER: But the point is that that would be easy to trace out, your Honor. It's a very simple --

the circuitry in the ticket issuign machine would be very easy to trace out to see whether, for example, there is a rejection signal responsive means.

MR. ISNER: You put your evidence in on it, Mr. Yuter. You put the drawings in.

MR. YUTER: You are spending some time here on this and I think --

MR. ISNER: We are talking about Exhibit R, the list of drawings. It doesn't go beyond that.

There was the Exhibit R drawings.

MR. YUTER: I think the Court understand our position. I am reading from page 15, line 2, just to complete the total deposition.

"Question: You didn't write any letters or anything to any other divisions of the company trying to locate those drawings?

"Answer: I didn't, but I think one of the two gentleman, I told them that they should check with our Cumberland Division. I don't believe I did.

"Question: You personally didn't check and you -- well, did you personally check?

"Answer: I don't remember if I did. I didn't check physically. I might have given them a call. That's the most I did. I've never been down to that

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Then H,"Interrogatory, state the percentages of each relevant market and submarket defined in the answer to Interrogatory NO. 18E, shared by each person in the relevant market."

And then there are subparagraphs requesting identification of documents, etcetera.

The answer to 18H:

"Upon information and belief and as presently advised, defendants have sold or leased 15 electronic totalisator systems. American Totalisator Company has sold or leased about 35 to 40 electronic totalisator systems and Western Totalisator Company has sold or leased about two electronic totalisator systems."

A person having knowledge above is --

THE COURT: Would you read that to me again?

MR. YUTER: "Upon information and belief and as presently advised, Defendants have sold or leased 15 electronic totalisator systems; American Totalisator Company has sold or leased about 35 to 40 electronic totalisator systems; and Western Totalisator Company has sold or leased about two electronic totalisator systems.

"A person having knowledge of the above is

THE COURT: Nobody said how many TIIs?

MR. YUTER: No one said how many TIIs, your Honor, and we don't know the dollar value. They did not respond to that. But I --

MR. ISNER: I don't think that's a fair statement, Mr. Yuter. The answer was we didn't know what the dollar volume was of American Tote. Again, your Honor, these -- seems to me this is just the way Mr. Yuter is trying to get some facts in the record, not admissions aginast interest.

THE COURT: These are judicial admissions and the fact that they are not against interest doesn't mean that they are not admissible, since they are admitted for the sole purpose of removing that as a debatable issue in the case.

MR. ISNER: I don't think we can properly characterize them as admissions against interest, though.

THE COURT: NO.

MR. YUTER: I'd like to read now from the Dodwell deposition, taken by plaintiff, Tuesday, April 9, 1974.

THE COURT: Oh, I meant to ask you, I -- the Weil deposition was taken from when to when?

"Answer: Can you tell where I was in '68? I don't know.

"Question: You said, 'My present position with the AUTUSA is executive vice president.' Have you changed and come back to that position since?

"Answer: No. I am vice president.

"Question: Have you had any additional formal education since December 13, 1968?

"Answer: No, I haven't.

"Question: Would you identify the current models of totalisators presently sold or leased by AUTUSA?

"Answer: Yes. We have only one model, which is a PSP-8 electronic totalisator system.

"Question: When did you phase out your earlier electromechanical systems?

"Answer: I'm sorry. We haven't. We still operate electromechanical."

THE COURT: What is that?

MR. YUTER: "We still operate electromechanical. I thought you meant what we were currently selling. We are not selling electromechanical. We are not manufacturing. We are still using the systems that we previously owned.

"Answer: I wouldn't know without looking it up. I don't keep those numbers in my head.

"Question: Is it fair to say that the U.S. handle is by far the predominant part?

"Answer: Oh, by far, yes.

"Question: Does American Tote have a competing all-electronic tote system?

"Answer: Yes.

"Question: How is it identified in the market?

"Answer: They call it the duplex system."

(continued next page.)

set aside, year in and year out, to service it.

"Question: On page 6, there is reference to the term 'Australian Tote.' Would you explain that term?

"Answer: It is a nickname.

"Question: For whom?

"Answer: For automatic totalisators in general, whether it be ATI, AUTUSA or Premier. It is all referred to in the trade as Australian tote.

"Question: Is the statement in the first paragraph on page 6 of Exhibit 1 true, to your knowledge?

"Answer: Yes.

"Question: The second paragraph?

"Answer: Yes.

"Question: Is the third paragraph true?

"Answer: Yes.

"Question: Is the fourth paragraph true?

"Answer: Yes.

"Question: Going over to page 7, is the first paragraph true?

"Answer: Yes.

"Question: Is the second paragraph of page 7 true, to your knowledge?

"Answer: Yes.

(A recess was taken.)

Q Turning to page 8, page 9 of Exhibit 1, would you indicate to your personal knowledge everything on that page is true, page 8 and page 9?

MR. ISNER: Please read each paragraph, Mr. Dodwell, and take your time to read it.

A I would say that basically it is very true.

Q Is there any statement that is untrue?

A No.

Q On page 8, paragraph 4, the statement is made: "In 1965 Automatic Totalisators were selected to install its revolutionary computerized system in the massive operations of the New York Racing Association."

Would you explain what the term "revolutionary" means in that context?

A Revolution was (1) that it was a system employing general purpose computers which enabled it to give a quick lead time for production, and flexibility of being able to give the racetrack other services if they needed it; other computer services if they required.

Q Then it was only revolutionary in the sense of using general purpose computers?

A That was one of the significant differences from what had happened in the past, yes.

unreliable and not to do it. We found a computerized tote was a tough thing to sell in North America.

Q Your competitor was American Tote?

A Yes.

Q Did American Tote ultimately follow your lead in putting out a dual mini-computer for electronic tote systems?

A Yes, they did.

Q When was that? Approximately when did they offer their first one for sale in competition with the PDP8 system?

A About '69, '70.

Q And prior to that time had American Tote taken the position that a reliable all-electronic tote could not be built?

A I don't know whether they believed it or not, but this is what they advocated.

Q Do you know how many years they had been advocating that?

A Oh, yes. I would say from around about '63, '64.

Q Was that in response to the work done by the Roosevelt-Westbury group to build an all-electronic tote?

A That is right. Not only that, but the offer by IBM at the same time to have a duplex system. IBM was offering it in '63, '64 and '65. That was Univac. American Tote and Univac combined to compete with ourselves and

A I'm sorry. I missed a word there.

THE COURT: Yes.

(Record read.)

Q -- do not exist simultaneously?

A Yes, I did hear that.

Q Do you agree with Dr. Highleyman's testimony?

A No, I don't. I guess that I didn't testify in that area earlier but I do believe that since the core memory does contain the entire software necessary to achieve the required functions, except when it's been destructively read out and is about to be restored, that all of the mechanism, if you will, necessary to perform any of these functions is in deed simultaneously present.

And that -- cause and effect relationship between the -- the appareance of the requirement for any function and the performance of that is controlled by the existence of the proper sub-routine or set of program steps in the core memroy and all such required lists of instructions are always in the computer when it's operating properly.

MR. YUTER: Miss Hyman, would you please mark as Plaintiff's Exhibit 150A --

THE CLERK: So marked.

xxx (So marked for identification, 150A.)

THE COURT: Are we back on Shea?

THE COURT: Yes, sir.

MR. YUTER: Yes, sir.

Good morning, your Honor.

THE COURT: Good morning.

R O B E R T W E I D A , having been previously duly sworn by the Clerk of the Court, resumed the stand and testified further on rebuttal:

DIRECT EXAMINATION

BY MR. YUTER: (Cont.)

Q Mr. Weida, is there a correctly you'd like to make in the transcript of yesterday's testimony?

A Yes, two things: Both on page 3597.

THE COURT: 3507?

THE WITNESS: 97. 3597.

THE COURT: 3597, yes.

THE WITNESS: The second answer, I -- I say, "No, I don't. I guess"-- it says, "I guess that I didn't testify " ...

I believe I said or meant to say or should have said, "I guess that I did testify in that area earlier but I do believe that since core memory"-- well --

THE COURT: That is a stenographic correction?

THE WITNESS: Yes.

THE COURT: Yes.

THE WITNESS: Aside from that, I may have introduced some confusion in that I said during that sentence --

THE COURT: This was on the question of co-existence?

THE WITNESS: Yes.

THE COURT: Yes.

THE WITNESS: I said that -- I mentioned that the--the instruction is read out of memory in the course of which it is indeed destructively read out and is about to be restored.

I may have left unclear the fact that as it is read out, it's -- it's read out into a memory register which is the source for its restoration as well as transmission to the control logic of the system.

THE COURT: So you would, after the word "restore" say, "It is read out into--?

THE WITNESS: Into the memory register and is--

THE COURT: The memory register?

THE WITNESS: Which would be a -- an array of flipflops --

THE COURT: Wait a minute, now. M-E-M-A?

THE WITNESS: No. Well, it would be in MEMA but it would be a non-core memory flipflop register.

THE COURT: Yes.

THE WITNESS: Which then holds it while it's to be restored into the core memory and also transferred to an instruction register which serves to control the computer for the course of the discussion of that instruction.

THE COURT: In other words, what you are saying is that it doesn't go out of existence? It's transferred in location to its functioning sites?

THE WITNESS: Yes.

THE COURT: S-i-t-e-s?

THE WITNESS: Including the one which serves, during that same memory cycle, to put it right back where it came from.

THE COURT: Then it goes home?

THE WITNESS: Yes.

THE COURT: And it goes as a -- a signal train?

THE WITNESS: Well, speaking about that one instruction --

THE COURT: Well, I take it, an instruction would occupy one or more stacks in the core memory?

THE WITNESS: I would expect one instruction normally to occupy one word or one vertical --

THE COURT: In other words, it would be a word and when it is withdrawn from the memory, it would have, for lack of a better term, the profile of a binary train, because it would be coded into binary language? It wouldn't be in words?

THE WITNESS: Well, the same binary pattern that existed in the core memory would now exist in the memory register.

THE COURT: Yes. Would now exist -- well, first, it would first exist on the wire that stretches from the core memory register?

THE WITNESS: Yes.

THE COURT: And there it would exist as a sequence, preserving the order of its presence in the core memory, the sequence of zero one plus or minus, on or off, events along the wire?

THE WITNESS: Well, if it were, for example, an instruction word 24 bits long, it would exist as a pattern of ones and zeros on the 24.

In other words, a spatial sequence.

THE COURT: Yes. In other words, it would be real time separated, impulse events along the wire and

moving along the wire in real time, very quickly, I take it, the conventional 300 kilometers a second or thereabouts -- from the core memory to the memory register, with -- and it would have to be an ordered sequence and the ordered sequence would be the exact counterpart of what it had been in the core memory?

THE WITNESS: Yes.

THE COURT: And so as it persists in the memory register and then where else?

THE WITNESS: Well, now that we've got it in the memory register, it would presumably be transferred also from the memory register to an instruction register, which has the specific function not -- not just of holding what came out of memory but of holding words that are intended to be regarded as instructions to be carried out.

THE COURT: Yes. Because at that point when it goes to the instruction register, it begins to modify other activity or control other activity?

THE WITNESS: Yes.

THE COURT: By leading it, pushing it or whatever, and then it journeys back again as a sequence--

THE WITNESS: No. It would be wiped out of

the instruction register. Within --

THE COURT: But it would not be wiped out except as a presence in the memory register and the instruction register because it would continue to exist?

THE WITNESS: Yes.

THE COURT: As a sequence of plus or minus aero or one or some such readable thing, along the wire on the way back to the core memory?

THE WITNESS: Yes.

THE COURT: And it would be restored to the same address in the core memory?

THE WITNESS: Yes.

THE COURT: And it would right side up?

THE WITNESS: Yes.

THE COURT: Because it has to be read, I take it, in the same sequence?

THE WITNESS: For future use.

THE COURT: It isn't like that Japanese word that you can read either way?

THE WITNESS: Right.

THE COURT: Right. Okay.

MR. YUTER: Exhibit DF, please.

BY MR. YUTER:

technology to try to avoid the claims.

Now, my question to you is this, Was there any -- In the first place, do you know of any such dilemma?

MR. ISNER: I object. I don't think the witness is competent to answer this question.

MR. YUTER: Yes. He signed the application. Those were his claims.

MR. ISNER: It doesn't say he is competent to answer that question.

THE COURT: Ask him what he had in mind.

THE WITNESS: We did not have in mind any concern, as I would call it, with protection against the earlier electro-mechanical systems.

Q What was your view about the practicality in 1965 of those earlier electro-mechanical systems?

A That it was a -- That it was a branch of technology that was gradually becoming obsolete.

Q When you signed the Oath, which referred to the claims, did you intend to cover electro-mechanical aggregators, for example?

A That would not have been in my mind.

(continued on next page.)

witness is competent to answer that.

THE COURT: What was that, sir?

MR. ISNER: I am objecting on the grounds of competency. I do not think the witness is competent to answer that question. The claims speak for themselves.

THE COURT: Well, let's find out what the contention is.

A Well, using the means and material of claims 20 to 22 enables us, providing an EDP tote, where it becomes economically attractive to do the daily double aggregation in the core memory, or core memories, and in fact, if you wanted 145 registers for a twelve horse field in race one --

THE COURT: I am sorry, if you wanted what?

THE WITNESS: If you needed 145 registers to aggregate all possible combinations of twelve horses in one race with twelve horses in another, and a total register, you are doing this with an EDP system, where you already have core memory devoted to the regular betting aggregation, and the programming required for data computation display, and whatever, the incremental cost to provide these 145 registers, where you already necessarily must have thousands of registers, anyway, it would amount to only a few hundred dollars. And if you

assume twenty-four bid words or registers, and assuming a cost at that time of perhaps ten cents per bid, including the required circuitry --

THE COURT: In other words, what they visualize, then, is that a bettor would step to the window, and announce the daily double bet, and the man operating the window -- I do not see how he would keep the first bet out of the first race pool -- I can see how he could take the first bet, but then the minute he depresses that key, as a practical matter, the ticket has issued.

THE WITNESS: No. Well, he is on a doubles machine. And the logic of the system, and of the doubles machine, is such that the system would respond to the depression of a single key on the doubles machine.

THE COURT: Yes, but you see claim 20 says "A race."

THE WITNESS: Where, in claim 20, is that, your Honor?

THE COURT: 20-A-1: ". . . A selected transactional signal . . ."

THE WITNESS: Well, if you look at a particular switch, that switch is associated with a particular entry in a particular race. When you look at a parti ular switch in the next bank, that switch is associated with

a particular entry in a race, but it is a different race.

THE COURT: Then, how does he -- Well, all right, go ahead.

THE WITNESS: So the incremental cost to do the daily double aggregation is small compared to the overall cost of the tote. And the extra logic required to accomplish it is correspondingly rather small in that most of the logic items are shared by the doubles and regular betting requiresments. And with the daily double being aggregated centrally --

THE COURT: But you would have to have a separate memory.

THE WITNESS: Not a separate memory. But of your thousands of words of core memory -- .

THE COURT: You would have to have a department -- You would have to have a segregated part of the core memory.

THE WITNESS: Well, just as you devoted a few dozen registers to the regular betting, win, place and show pool functions, and devoted quite a bit, or a larger number of memory positions to the storing of the constructions for computing payoff, and presenting displace, and so forth, now you need approximately another 150 registers,

which is a small number compared to what you need for the programming, to provide the daily double, the function of the, say, thirty-nine or so core memory words bid for regular betting, that is, you need twelve, plus one for win; twelve, plus one for place; twelve, plus one for show. And now you need twelve times twelve, plus one for daily double. But those are small numbers compared to what you would provide and need for programming of the things like the payoff computation, the generation of reports, and so forth.

And now that you are doing the aggregating centrally you have the computer -- It's a short step to compute the daily double probable odds payoff -- probable payoff -- I should say. And that means that since you can do that in seconds rather than rely on a manual or adding machine type computation, you can, as we said before -- This gives you the means of holding the betting open until you are ready to start the first race.

(continued on next page.)

DDS:tr 6/2 am

In addition by doing this you have eliminated the turmoil and error prone situation associated with the manual processes of computing -- of doing daily double aggregation.

Therefore this to me means that these claims 20 to 22 were the means to derive these advantages and therefore as to have that significant connection with the daily double, namely to provide the means as an economic and efficient way of handling the daily double in a better way.

THE COURT: Is this a convenient place?

MR. YUTER: Yes, it would be very convenient.

THE COURT: Five after 2:00.

MR. YUTER: Yes sir.

MR. ISNER: If your Honor please, you asked the other day when the Weil deposition was taken. These are the dates when it was taken.

MR. YUTER: What dates are those?

(Document handed to Court.)

MR. ISNER: If your Honor please, if we are now a few minutes of ending, I am willing to get through now.

MR. YUTER: I would like to finish.

THE COURT: What is that?

GR:GA
T:R1 PM

THE COURT: Well, what concerns us ultimately, though, is whether this was a -- Well, to put it in the lowest terms, whether the time had become ripe to do the obvious, and they did the obvious.

In other words, that what you did not have here is not a technological advance, but an act of faith in the technology of with the time.

MR. YUTER: But that technology at the time existed as early as 1952.

THE COURT: I know. That is just the problem. I think you will find Mr. Isner courting that to you.

MR. YUTER: You see --

THE COURT: Well, that is the problem. I've tried my best to understand it. Let's see if I can.

MR. YUTER: Could I just, to go back to the signals again, I thought --

THE COURT: Yes.

MR. YUTER: I thought you were driving back toward the scan counter and the -- going to Figure 1-A, the --

THE COURT: Yes?

MR. YUTER: The SKNA signal, which is the output of the scan counter SKA on Figure 2.

THE COURT: Yes.

MR. YUTER: That is a -- in your terms, an inflected combination of signals.

THE COURT: Multi -- That would be a cable?

MR. YUTER: That would be a cable on which in parallel the signals would have the representation in binary code of the TIM number, and then that is decoded by the scanner to one line, but it starts from, let's say, a combination of six lines.

In other words, the scan counter itself generates a coded combination of signals, representing the TIM number and --

THE COURT: Why do you say -- Say that again.

MR. YUTER: The scan counter generates a parallel representation in binary coded form of the number of the TIM, and that signal is on the cable SKNA, and SKNA comes out of the scan counter in Figure 2.

THE COURT: That comes out on as many wires as you are using in your code?

MR. YUTER: Precisely, and goes to the scanner SCA, where --

THE COURT: What would that mean in this case?

MR. YUTER: So at that point --

THE COURT: How many wires would it mean in this case?

MR. YUTER: Depends on the number of TIM's, your Honor. You'd have to have a binary coded number that's large enough to cover the total number of TIM's. So if

if it were -- Am I right, Mr. Weida?

MR. WEIDA: Seven lines for 128 TIM's.

MR. YUTER: Seven lines for 128 TIM's, which would be two to the sevenths, is the -- So that would be a binary --

THE COURT: Seven lines of one sort -- what sort?

MR. ISNER: Coming down in parallel.

MR. YUTER: Seven parallel lines on which you would have either a binary one or a binary zero, and that coded combination, at that point, --

THE COURT: Wait a minute.

In other words, you would have coming out seven lines?

MR. YUTER: In which the data on those lines would be coded in binary number form, to represent in binary code the ticket-issuing machine number.

MR. ISNER: Here (Indicating) it is.

THE COURT: It would represent it as a regular number?

MR. YUTER: Pure binary.

THE COURT: Pure binary number? Not octal, or anything?

MR. YUTER: Not octal or decimal-coded.

THE COURT: If you had an octal one, what you would have to do is, you would have, I guess --

MR. YUTER: The octal number system is very similar to the binary system in how --

THE COURT: No. I was wondering how that comes out. Does that come out in parallel, or one wire for each set? Each sub-set?

MR. YUTER: This system at this point was a parallel machine, your Honor, so the data -- the coded data was being carried, like your West Point cadets, except that some of the cadets are in position. Other cadets are not.

THE COURT: Let me camp that up. Two, four, eight, sixteen, thirty-two, sixy-four, one twenty-eight?

MR. HIGHLEYMAN: That's right.

THE COURT: So that is two to the seventh?

MR. WEIDA: Right.

MR. HIGHLEYMAN: I might just comment on your question about the octal -- the use of the octal numbering system, your Honor.

In the computer art as it existed then and today, we use that as a convenience. It does not really affect the physical structure.

THE COURT: Because you really have to use, if you are going to operate in parallel and not serially, you would have to use as many wires as you had binary number places?

MR. HIGHLEYMAN: That's right. And the convenience is simply, instead of saying that these wire contain a one-zero-one-one-one-zero-one, we say it contains a one thirty-five in octal, because we know that an octal three represents three wires, which is zero-one-one. It's a very fast mental conversion that we hardware-software types --

THE COURT: Only if you are used to it.

MR. HIGHLEYMAN: Yes.

MR. WEIDA: It's a labor-saving device, a shorthand, so with one symbol you write down three bits.

MR. HIGHLEYMAN: That's a good explanation of it. It's strictly a convention. It has nothing to do with affecting the hardware design, or the implementation, or anything else.

MR. WEIDA: There is no eight --

THE COURT: Why didn't that surface in the -- I keep forgetting the name of it -- in the Benson case?

MR. HIGHLEYMAN: Benson?

THE COURT: That is about the only thing that was not mentioned.

MR. YUTER: Benson --

THE COURT: No matter.

MR. YUTER: That is a different kind of a claim, your Honor, where they were claiming an algerithm soft-

IN THE UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK
- x

DIGITRONICS CORPORATION, NOW
AMPEREX ELECTRONIC CORPORATION,

Plaintiff,

v.

Index No.
67 C 1119

THE NEW YORK RACING ASSOCIATION, INC.,
AUTOMATIC TOTALISATORS (U.S.A.) LTD.,
AUTOMATIC TOTALISATORS LTD. and
PREMIER EQUIPMENT PROPRIETARY LTD.,

Defendants.

- x

AFFIDAVIT OF S. C. YUTER

STATE OF NEW YORK)
) ss.:
COUNTY OF NEW YORK)

S. C. Yuter, being duly sworn, deposes and says that:

(1) He is the attorney for plaintiff in the above-identified action and he makes this affidavit in support of the accompanying combined motions to reopen discovery, etc.

(2) Each of the statements of fact in the accompanying combined motions is true or, on information and belief, is believed to be true.

S. C. Yuter

Sworn to before me this

29th day of October, 1975.

Maureen Davidson

MAUREEN DAVIDSON
Notary Public, State of New York
No. 31-4504750
Qualified in Kings County
Certificate Filed in New York County
Commission Expires March 30, 1976

A1356

IN THE UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK
- x

DIGITRONICS CORPORATION, NOW
AMPEREX ELECTRONIC CORPORATION,

Plaintiff,

v.

Index No.
67 C 1119

THE NEW YORK RACING ASSOCIATION, INC.,
AUTOMATIC TOTALISATORS (U.S.A.) LTD.,
AUTOMATIC TOTALISATORS LTD. and
PREMIER EQUIPMENT PROPRIETARY LTD.,

Defendants.

- x

COMBINED PLAINTIFF'S MOTIONS TO:

(1) REOPEN DISCOVERY TO
   (a) PERMIT PLAINTIFF TO OPPOSE DEFENDANTS' MOTION FOR ATTORNEYS FEES, AND
   (b) LOCATE THE MISSING DEMONSTRATOR DRAWINGS, AND

(2) EXTEND THE TIME BY THIRTY DAYS (FROM NOV. 6TH) FOR ORAL ARGUMENT OF THE PENDING MOTIONS TO AMEND THE FINDINGS OF FACT AND JUDGMENT
   (a) FOR TIME FOR SAID DISCOVERY, AND
   (b) TO SUPPLEMENT SAID PENDING MOTIONS;

Or Alternatively

(3) TO EXTEND THE TIME BY SEVEN DAYS (FROM NOV. 6TH) TO PERMIT JUDGE DOOLING TO DECIDE THESE MOTIONS WHEN HE RETURNS FROM VACATION NEXT WEEK.

Plaintiff moves the Court for an Order granting the above motions (1) and (2), or alternative motion (3), for reasons including the following:

(1) Defendants base their attorneys fees motion, in part, on a finding by the Court that plaintiff failed to produce drawings of a demonstrator-prototype relied on by defendants.

(2) But the Court also found that a set of demonstrator drawings was at Roosevelt Raceway with the demonstrator (Memorandum and Order, p. 60); and the demonstrator admittedly was located by defendants at Roosevelt Raceway about June 1972 (Giardino Affidavit, Appendix 5 (attorney-client communication), page 2, par. 3a), and admittedly was later actually acquired by them (without knowledge of the plaintiff until defendants admitted that in open court on June 19, 1974).

(3) But in March 1974 Roosevelt informed plaintiff that it did not have the demonstrator "and does not know where it is." (Attached Exhibit A, par. 3). (That statement may evidence Roosevelt's identification with the interest of defendants in invalidating the patent, perhaps because Roosevelt is dependent on an accused infringement.)

(4) Neither defendants nor Roosevelt has ever explained what happened to the Roosevelt demonstrator drawings, if they were not with the demonstrator.

(5) During discovery prior to the trial, both plaintiff and defendants made an extensive though unsuccessful search for the missing demonstrator drawings -- at Digitronics' successor-in-interest, Iomec, Inc., at Southboro, Mass., at Roosevelt Raceway, and in many days of inspection of voluminous documents collected by Roosevelt's attorneys in connection with their antitrust suit against AmTote.

(6) The patented electronic totalisator, the First Tote, was serviced by AmTote (AmTote's Fosse, TR 2099-2100) subsequent to its acquisition by AmTote in 1967 (see attached Roosevelt letter, Exhibit B, par. 4). AmTote thus acquired the First Tote drawings and, presumably, had access to the demonstrator drawings.

(7) The First Tote was later replaced by AmTote with its own electronic tote (an accused infringement) and AmTote removed the First Tote (Exhibit B, par. 4) and,presumably, the First Tote drawings, possibly including the Roosevelt demonstrator drawings.

(8) In sum, neither defendants nor Roosevelt have explained what happened to the Roosevelt demonstrator drawings, and it is possible that AmTote, an accused infringer, may know what happened to them.

(9) Accordingly, additional discovery is needed to see if the Roosevelt demonstrator drawings can be found. If found, then both plaintiff's Mr. Weida and defendants' Dr. Highleyman could rapidly check the drawings to determine the accuracy of Mr. Weida's mental reconstruction. That is extremely important, because claims 23-27 were invalidated over the demonstrator because of the missing drawings and the consequent failure of the Court to accept Mr. Weida's testimony as credible.

(10) When defendants stated on November 11, 1974 that they would rely on the Weida testimony and admissions rather than trace out the circuits of the demonstrator (attached Exhibit C, par. 2), there seemed to be no need for the missing drawings. Since the Court thereafter

penalized plaintiff for failing to find or explain the missing drawings (notwithstanding defendants' reliance on the Weida testimony and the burden of proof being on defendants), plaintiff reopened the search on October 5, 1975. See the attached Weida Affidavit. New leads have now been uncovered and the discovery tools are necessary to follow them up since they lead to parties having an adverse interest to plaintiff.

(11) Defendants rely on attorney-client communications (Giardino Affidavit, Appendices 4 and 5) in support of their motions. Thus, they have waived the attorney-client privilege and plaintiff should be permitted to discover any other such communications, relating to the same subject matter, which may be to plaintiff's advantage or neutralize the effect of those relied on by defendants. Western Union Tel. Co. v. Baltimore & Ohio Tel. Co., 26 F. 55 (S.D.N.Y. 1885); In re Associated Gas & Elect. Co., 59 F. Supp. 743, 744 (S.D.N.Y. 1944); Kinglig Jarnvagsstyrelsen v. Dexter & Carpenter, 32 F.2d 195, 201 (2d Cir. 1929); 8 Wigmore, Evidence, § 2328 at 638.

(12) Finally, plaintiff has not yet completed its detailed study of the Court's Memoranda and Order (257 pages) in order to supplement its pending motions to amend the findings, etc., and requires additional time to do that in a reasonably concise and organized way.

Respectfully submitted,

S. C. Yuter

S. C. Yuter
Attorney for Plaintiff
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New York, N.Y. 10016
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A1360

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502 RING BUILDING
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202 331-8585

March 15, 1974

Sy Yuter, Esq.
Yuter & Fields
605 Third Avenue
New York, N. Y. 10016

Re: Digitronics Corporation v. New York Racing Association, et al

Dear Mr. Yuter:

Roosevelt Raceway has asked me to answer and handle the documentation involved in connection with your letter to Mr. Fosner of February 11, in connection with the above litigation in which you are engaged.

Answering said letter, we advise as follows:

1. As to the "prototype of an electronic totalizator" referred to in Subparagraph (1) of your letter, I am advised that Roosevelt Raceway has searched for the same, but, it does not have it and does not know where it is.

2. Correspondence covered by Item (2) of your letter has been forwarded to me which you may examine at our office under the conditions and reservations heretofore obtained in connection with your examination of our files.

3. Item (3) of your letter asks for earlier Roosevelt's efforts (1961) to obtain or build an electronic tote. As to this, if you have any specific knowledge of any such efforts and can identify the party involved, Roosevelt Raceway will make a search

Exhibit

to find out whether it has any correspondence or documentation in connection with your specifications. However, Item (3) as presently phrased is just too broad and would result in a burdensome search.

4. I have correspondence forwarded to me re your Item (4) which you may examine as per Item (2) above.

5. As to Item (5) which covers, "All reactions of the racing industry to the electronic tote of the type indicated by the attached copies of letters from the Buffalo Trotting Association and the Milnerton Turf Club", our response as to Item (3) above, is applicable.

Please advise Miss Auleta, of our office, when you or Mr. Isner may want to examine the documentation we have at hand re the above.

We assume that as per past practice, we will be compensated our time and expenses in complying with your request. We do not know if Mr. Isner's client is obligated for 50% of the same as per our past relations. If not, we will look to you nad your client to pay us 100% of our invoice for the same.

Sincerely,

John Howley

JH:mb
cc.: Robert E. Isner, Esq.
Mr. S. Harvey Fosner
The Hon. Max Schiffman

P.S. We also have the Weil examination for you.

A1362

Roosevelt Raceway
WESTBURY, NEW YORK 11590
PIONEER 6-6000

EXECUTIVE OFFICE

February 13, 1974

S. C. Yuter, Esq.
Yuter & Fields
605 Third Avenue
New York, New York 10016

Re: Digitronics Corporation v. The
New York Racing Association et al

Dear Mr. Yuter:

Your letter of February 11, 1974 is incorrect in several respects.

We nevertheless desire to do everything we reasonably can to attempt to locate the documents you seek, while not in turn disrupting our own daily operations, nor needlessly diverting operational officials from performing their own daily functions.

Accordingly, your letter is being turned over to the Head of our File Room (along with a copy of my reply to you) with the request that every effort be made to attempt to locate the described documents; that when and if so located, photocopies be made which will be duly transmitted to you and Messrs. Howley and Isner.

You are evidently laboring under some misapprehension that the Westbury electronic system, we pioneered is still in use and/or in operation at the Raceway. That is incorrect. The American Totalisator Company (Am Tote) has removed the totalisator and ticket issuers (subsequent to its acquisition in 1967) and has since substituted all of the equipment with its own electronic system and ticket-issuers.

Thus, as you should know by now, the totalisator system at Roosevelt Raceway (as is in effect at all tracks in New York, other than N.Y.R.A.) is owned, serviced and operated by Am Tote. If you desire to learn more about their equipment and/or operations you should address your inquiry to Am Tote.

Very truly yours,

S. Harvey Fosner

S. Harvey Fosner
Executive Vice President &
Counsel

SHF:mm
cc: J. Howley, Esq.
R. Isner, Esq.

Exhibit B

A1363

NIMS, HOWES, COLLISON & ISNER
LINCOLN BUILDING
60 EAST 42ND STREET, NEW YORK, N.Y. 10017

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CABLE: NIMS

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NNETH R. UMANS
TER J. FRANCO
MES MONTALTO

November 11, 1974

S. C. Yuter, Esq.
605 Third Avenue
New York, New York 10016

Re: Digitronics Corp. v. The New York Racing Association, et al, Civil Action 67 C 1119
Docket 10817

Dear Sy:

This is a belated reply to your letter of October 2nd.

In view of the testimony and admissions elicited to date concerning the correspondence between the structure and mode of operation of the demonstrator unit and the claims of the Weida patent, we do not intend to trace out the circuits of such unit for use at the trial.

With respect to drawing no. D-C 672, I am looking forward to examining the same and would appreciate your keeping the particular microfilm in which it appears available for my inspection.

The recent location of additional Ernst photographs of the Ticket Issuing Machine as well as the noted drawings therewith is of great interest. Not only are the three Ernst photos (Nos. 3592/8-10) of considerable interest, but the additional photos as transmitted to me with your letter of October 11, 1974 and marked PX71-PX85 are of much greater interest. I am taking steps to secure a duplicate set thereof from Mr. Ernst.

Apart from the foregoing, I would like to inspect the various materials identified in your October 7, 1974 letter and

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will be in touch with you shortly as to a convenient time therefor.

Very truly yours,

Robert E. Isner

REI:mjh
cc: John F. Dooling, Jr., USDJ
Honorable Max Schiffman
James Flynn, Esq.
Russell G. Pelton, Esq.

IN THE UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK
----------x

DIGITRONICS CORPORATION, NOW
AMPEREX ELECTRONIC CORPORATION,

Plaintiff,

v.

Index No.
67 C 1119

THE NEW YORK RACING ASSOCIATION, INC.,
AUTOMATIC TOTALISATORS (U.S.A.) LTD.,
AUTOMATIC TOTALISATORS LTD. and
PREMIER EQUIPMENT PROPRIETARY LTD.,

Defendants.

----------x

AFFIDAVIT OF ROBERT L. WEIDA

STATE OF NEW YORK)
) ss.:
COUNTY OF NEW YORK)

Robert L. Weida, being duly sworn, deposes and says that:

(1) On October 7, 1975, Mr. Yuter asked me to contact Marcel Stella at Roosevelt Raceway, or whomever else could shed light on the present whereabouts of the prints of the logic and wiring drawings of the Demonstrator Totalisator.

(2) Since I was asked to study and analyze about two dozen other issues raised by the Court's decision, I did not get to contact Mr. Stella and his supervisor, Mr. Harold Zinsmeister, until October 15. Because of continued pressure to conclude study of the other issues, I did not return to this matter of the logic drawings of the Demonstrator until October 21. By this time, Mr. Yuter had broadened the topic to cover an investigation of the original tracings missing from the Digitronics drawing files and from the available microfilm file. The major portion of the investigative activity to date took place during October 21 to October 28.

(3) In connection with my investigation of the drawings, found neither at Roosevelt Raceway nor by the defendants with the Demonstrator unit when they acquired it, I talked again to Marcel Stella and Harold Zinsmeister of Roosevelt Raceway and to Bruce Honnald and Lawrence Reilly, both formerly associated with maintenance and operation of the First Totalisator at Roosevelt Raceway. In connection with the investigation of the missing original tracings and microfilm copies, I talked to persons associated with the Digitronics documentation effort over the period 1960 to 1974. We do not have any direct lead on the present existence or location of the prints or of the originals. We do have a number of new facts which require further study and a number of questions which need further investigation:

(a) Mr. Stella appears to have requested a new set of prints from Mr. James Caporizo of the Digitronics Engineering Department in the late sixties and appears to have been told that Digitronics was unable to find the originals, so no prints could be made. We are still trying to contact Mr. Caporizo on this. He has been away on a business trip.

(b) We realized, in discussing the problem of the missing originals with all of the above-named people, that there had been no mention of the aperture card tub file of microfilm images which was used in the Digitronics drafting department as a reference file (as opposed to the 35 mm roll microfilm file, which was kept in safe deposit box bank vaults in Albertson and Framingham). This aperture card file would be another possible source of the Demonstrator logical drawings.

(c) In attempting to track down the set of prints which we know were at Roosevelt in 1962, we find that we are hampered by lack of access to people and records directly connected to the Demonstrator and its set of drawings. According to one report, the drawings were separated from the machine

several years before it was acquired by ATUSA. But we need to talk to the people directly and immediately connected with the decision and the implementation of the decision to send it from Roosevelt Raceway and to receive it at the ATUSA headquarters. Particular persons we need information from include Mr. Nick Barter of AMTOTE, Mr. Ole Fosse of AMTOTE, Mr. Harvey Fosner of Roosevelt Raceway, and Mr. Keith Dodwell of ATUSA.

(d) Since we have a report of a massive reorganization of the storage space where the Demonstrator was situated, we need access to the persons who ordered, supervised, and carried out this reorganization to attempt to turn up the drawings or to learn of their ultimate disposition.

(e) In addition, we find that, having reviewed the information received from Messrs. Kaler, Pages, Stella, and Zinsmeister, we need time to ask some further questions before we are able to make a rational decision on the next steps which should be taken in the investigation.

Robert L. Weida

Robert L. Weida

Sworn to before me this
29th day of October, 1975.

Maureen Davidson

MAUREEN DAVIDSON
Notary Public, State of New York
No. [illegible]00
Qualified in Queens County
Certificate filed in New York County
Commission Expires March 30, 1976

A1368

IN THE UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK
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DIGITRONICS CORPORATION, NOW
AMPEREX ELECTRONIC CORPORATION,

Plaintiff,

v.

Index No.
67 C 1119

THE NEW YORK RACING ASSOCIATION, INC.,
AUTOMATIC TOTALISATORS (U.S.A.) LTD.,
AUTOMATIC TOTALISATORS LTD. and
PREMIER EQUIPMENT PROPRIETARY LTD.,

Defendants.

----------x

SUPPLEMENTAL AFFIDAVIT OF ROBERT L. WEIDA

STATE OF NEW YORK)
) ss.:
COUNTY OF NEW YORK)

Robert L. Weida, being duly sworn, deposes and says that:

(4) During the period October 29 to November 5, I have continued the investigation of, and search for, both the originals (tracings) of the logic and wiring drawings of the Demonstrator Totalisator and the set of prints known to have been at Roosevelt Raceway with the unit in 1961.

(5) It should be noted here that the missing documentation includes, as indicated by DXR, 90 D-sized drawings. Each D-sized drawing is 24 inches by 34 inches. (The drawing size is coded by the first letter of the drawing number) Thus, they should not be easily misplaced. Assuming that there was an average of one revision per drawing, there should then be 90 aperture cards in the current file and about the same number in the aperture card history files. There should similarly be about 180 Demonstrator drawing images on rolls of "security" microfilm, mostly in several clusters corresponding to the original drawing approval and

the several major drawing revision approval cycles.

(6) The most notable development was the discovery that the Demonstrator logic drawing numbers listed on DXR ("Drawing List of Job No. 4726") may be incorrect. Mr. Richard Kaler, who I spoke to on October 31, 1975, informed me on that date that he was working in the Digitronics Engineering Services group when the Demonstrator was being designed and developed in 1960, and remembers that there was a series of errors in assigning drawing numbers and that a large number of drawings had to be renumbered. Mr. Kaler said the renumbering consisted of using a so-called "block number" to denote the collection of drawings for a given job. This is done for the Demonstrator electrical wiring drawings (which are, of course, normally done after the logic drawings). The electrical wiring drawings cover the range of numbers DK305-4 to DK305-63. (The "305" is the block number.), according to DXR.

(7) I have been in continual contact with Mr. Kolling the Director of Engineering for IOMEC at Santa Clara. According to Mr. Kolling, some Digitronics engineering documentation is now stored in a warehouse there and Mr. Kolling's group has cognizance of it. In addition to asking him to recheck the files for the drawings listed on DXR (in tracing files, among rolls of microfilm reels, in the tub file of "current" aperture cards, and the two file cabinets of historical aperture cards), I have also asked him to search for the grey cloth-covered accounting ledgers which were the log books for drawing numbers. If the Demonstrator drawings were part of the erroneous numbering accident, the drawing log book for logical drawings (a second character of "G", as in DG-305 characterizes the numbers of logic drawings). the drawing log should have an entry like "SUPERSEDED by DG305-81" for each of the logic drawing numbers from DG479 through DG551 which appear on DXR, according to Mr. Kaler. I made

my last inquiry of Mr. Kolling on November 4 and expect to have a report back from him imminently. If his search is unsuccessful, it may be necessary to send out to Santa Clara someone thoroughly familiar with the Digitronics Albertson engineering documentation to complete the search.

(8) On November 3, I spoke by telephone with Mr. Norman Ward who, Mr. Warren said, was in charge of the final shut-down activities at Southboro. (According to Mr. Warren, the Southboro plant received Albertson Digitronics documentation when Albertson closed.) Mr. Ward said that in October 1974, just prior to closing the plant, representatives from Santa Clara (IOMEC headquarters and intended site of printer development), Cumberland (paper tape unit production) and Needham (data terminal and printer service) met and went over the drawings. Each representative took what was of interest to his own plant. Mr. Ward said that the flat steel files were emptied and sold. According to Mr. Ward, the remaining drawings, which could still include the Demonstrator logics under a different set of numbers, were left in the warehouse in Saxonville, Massachusetts. Mr. Warren described this location as "The Roxbury Carpet Building at Saxonville, near Framingham." Mr. Ward felt that some microfilm might still be there, particularly the aperture card history file. He also remembers seeing the above-mentioned drawing log ledger books there. On November 5, we received permission from DATA 100 in Minneapolis (which owns IOMEC) to inspect and copy material from the documentation in Saxonville. Therefore, I have arranged a trip to this warehouse on November 7.

(9) Mr. Kaler stated his positive belief to me that the Digitronics microfilm program was in operation when the Demonstrator was being designed. He estimates that there were well over one hundred reels of microfilm in the Albertson bank vault when he left Digitronics in 1968. (He noted that

until he took charge of Engineering Services in 1962, roll microfilm was kept in the Accounting Department safe.) He recalls the early microfilm reels were carefully marked as to their contents.

(10) It should also be noted that Messrs Kaler, Inkpen and Pages (all formerly of Engineering Services) remember that some Roosevelt tote drawings were kept in a special file in "Building 2" in Albertson, (Building 1 contained Engineering Services proper) and that there seems, within Engineering Services proper, to have been a separate file of Roosevelt tote drawings. Therefore, I believe that upon the facts we now have discovered, searching the main file in normal numerical sequence might not be a sufficient search.

(11) I also spoke by telephone on October 30, 1975 with Mr. Walter Creed, who did maintenance on the Demonstrator and ran demonstrations of it at the track in the early sixties. However, he was only able to substantiate that the Demonstrator operated in a small locked room by itself and that when he last saw it, about thirteen years ago, there was a set of prints in the locked room with the Demonstrator.

(12) After reviewing Mr. Warren's 1974 deposition, I also spoke to him by telephone on October 30, 1975. He recollected the set of about one hundred rolls of microfilm, the tub file of "current" aperture cards, and the two filing cabinets of historical aperture cards. He recollects doing a rapid search of these files. He seemed to feel that the gap in the aperture card file where the Demonstrator logic drawings should have been was larger than the Demonstrator logic drawing sequence. This suggests to me that these drawings were not uniquely missing and lending some support to the hypothesis that a number of logic drawings, besides the Demonstrator logic drawings, were misnumbered and renumbered in 1960.

(13) I spoke to Messrs. Pages, Inkpen, Caporizo, Stella and Zinsmeister in the period October 30 to November 1 to assess the report that the original tracings of the Demonstrator logics were already missing as early as 1968. Messrs. Pages and Inkpen worked in Engineering Services and Mr. Inkpen was directly responsible for the drawing files. Mr. Caporizo handled liaison on technical matters with Roosevelt Raceway. Mr. Caporizo remembers various requests for drawings in this period of time but does not remember a request specifically for Demonstrator drawings. Mr. Inkpen remembers finding requested drawings and making prints available to Mr. Caporizo for transmission to Mr. Stella, but also does not specifically remember dealing with Demonstrator drawings. Mr. Pages does remember that Demonstrator drawings were requested, as Mr. Stella suggests. He related this to the fact that he was asked to provide a copy of computer-produced automatic layout printouts on the Demonstrator. He said he could not do this because the Demonstrator development antedated this automated procedure at Digitronics. He believes Mr. Inkpen did find the Demonstrator logics and that they were then microfilmed.

(14) To sum up, as of November 5:

(a) We need to receive and assess the report from Mr. Kolling of IOMEC on any relevant Demonstrator documentation which may be at Santa Clara (particularly the log books, which may reveal new numbers for the logics). It may still be necessary to send someone to inspect this material at Santa Clara, or have some of it sent here.

(b) We need to investigate the material remaining at Saxonville, particularly to look for the drawing logs, and to follow up on what we learn from them.

(c) We need to talk to a number of people who may know about the ultimate disposition of the Demonstrator logic prints directly associated with the unit itself.

Robert L. Weida

Sworn to before me this
6th day of November, 1975.

YVONNE H. McDONALD
Notary Public, State of New York
No. 03-2613075
Qualified in Bronx County
Certificate filed in New York County
Commission Expires March 30, 1977

IN THE UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK
----------x

DIGITRONICS CORPORATION, NOW
AMPEREX ELECTRONIC CORPORATION,

Plaintiff,

v.

Index No.
67 C 1119

THE NEW YORK RACING ASSOCIATION, INC.,
AUTOMATIC TOTALISATORS (U.S.A.) LTD.,
AUTOMATIC TOTALISATORS LTD. and
PREMIER EQUIPMENT PROPRIETARY LTD.,

Defendants.
----------x

SECOND SUPPLEMENTAL
AFFIDAVIT OF ROBERT L. WEIDA

STATE OF NEW YORK)
) ss.:
COUNTY OF NEW YORK)

Robert L. Weida, being duly sworn, deposes and says that:

(15) On November 11, 1975, Mr. Kolling, who is in charge of the IOMEC operation in Santa Clara, California, reported that his staff could not find any trace of the drawings referenced by DXR, either in tracing form or in microfilm (roll or aperture card) form. Mr. Kolling said that their search included scanning thirty rolls of microfilm in their possession which they received from Southboro.

(16) On November 16, 1975, I spoke to John Spears of the IOMEC field service headquarters at Elmhurst, Illinois. He informed me that John Tetter, who is in charge at the IOMEC Needham field service office, would be knowledgeable about the documentation contained in the Saxonville, Massachusetts warehouse. He also said that Mr. Arnold Lohnes of the Elmhurst, Illinois site would know about any Albertson/Digitronics documentation present at the Elmhurst, Illinois site. However, Mr. Spears said that other duties would prevent Mr. Lohnes from searching for the DXR documents until December 1st.

(17) As suggested by Mr. Spears, I spoke to Mr. John Tetter on November 18. During the week of November 24 to 30, 1975, Mr. Tetter of IOMEC/Needham searched the Saxonville warehouse for the Digitronics/Albertson engineering drawing number log books. A thorough search revealed no trace of them.

(18) Mr. Tetter's search of the tracings still at the warehouse did turn up a drawing number conflict. He found drawings which conflict with DG500, DG501, DG502, DG503, DG504, DG505, and DG506 of the Prototype drawing list. The conflicting drawing documents deal with the control logic for six printer controller systems built for Addressograph-Multigraph for magazine subscription label printing and are discussed below in their proper context.

(19) Mr. Tetter also researched the aperture card tub file, but found that it contained no logic drawings (DG drawing numbers) whatsoever. He also finds that the two aperture card history files are not in the Saxonville warehouse.

(20) On December 2, 1975, I found that Mr. Ray Duhamel, who is in charge of Engineering Services at the Cumberland, Rhode Island, plant of IOMEC, was in possession of at least some of the Albertson engineering drawing number log books. I have received copies of those pages which bear upon the drawing numbers referenced by DXR and these copies are discussed below in their proper context.

(21) On December 2, 1975, I also spoke to Mr. Arnold Lohnes at the IOMEC field service headquarters in Elmhurst, Illinois. I found that he was unable to discover, at that site, any trace of the DXR drawings, either in tracing or microfilm form.

(22) From October 7, 1975, to the current date, I have made an exhaustive investigation, involving over 60 hours of my time, to locate a set of Prototype drawings. That investigation has uncovered persuasive evidence that the Prototype drawing number

were changed from those on Exhibit R (probably in 1960), which most probably explains why the logic drawings could not be located by IOMEC prior to the trial. That evidence includes the following points:

(a) Exhibit 1 (attached) consists of copies of those pages of the specific Digitronics drawing number log book that contain the record of the logic drawings on DXR (DG479 through DG508, plus DG537 and DG551). Exhibit 2 (attached) consists of the title boxes of a sample of the conflicting drawings first referred to in paragraph (18) above.

(a1) At this point, it is necessary to briefly describe the essentials of Digitronics' drawing numbering system. Every drawing number has two alphabetic characters, followed by a numeric sequence number. The first letter is just a code for drawing size (A=8 1/2 x11, B=11x17, C=17x22, D=22x34 inches). The second letter is a "type of drawing" code which indicates the general subject of the drawing (e.g. A = mechanical detail, C = mechanical assembly, G = logic, K = electrical wiring). There is a separate sequence number for each "type of drawing" code. That is, there could exist a DA123 and DG123 and a DK123 and a DC123. Each is a unique drawing, distinguished from the others by the second letter, (the "type of drawing" code). In addition, there are drawing numbers which also have, as a suffix, a dash followed by another sequence number (e.g. DG123-1, DG123-2, etc.). As used for logic drawings (code G) and for electrical wiring drawings (code K), these "dash numbers" have the following significance. A given primary sequence number (i.e. the 123 in DG123-2) corresponds to a particular piece of equipment design. If there are ten logic drawings for that piece of equipment, they may be numbered DG123-1 through DG123-10. In the early years at Digitronics (as in the case of the logic drawings on DXR) each logic and electrical wiring drawing had its own primary sequence number. Eventually (as in the case of wiring drawings on DXR) related

groups of logic and electrical wiring drawings were numbered by groups so that related logics would have the same primary sequence number but distinguishing dash numbers. The same is true for electrical wiring drawings.

(a2) The Exhibit 2 samples are selected as typical examples of six different families of logic drawings. The primary sequence numbers for the six families are 500, 501, 502, 503, 504, and 505. When logic drawings are numbered in this "family" fashion, the first drawing number is always designated "-1". The dash number is never omitted. In such families of drawings there will never be a DG500 without the dash number. There is also never a mixture of drawings from two different pieces of equipment in the same drawing number "family".

(a3) Exhibit 3 is a chart listing each DXR drawing number for which there is a conflicting family of AM (Addressograph-Multigraph) printer control logic drawings.

(a4) I had worked on earlier members of the series of AM printer controllers and I had continued to work in an advisory capacity on these six printer controllers after being assigned to work on the pari-mutuel Prototype. I specifically remember the six job order numbers. However, I had no close connection to the drawings for the six new units and never realized at that time that a drawing number conflict existed.

(a5) It should, of course, be made clear that the conflicting printer controller drawings are for units wholly unrelated to the Prototype.

(a6) On the basis of these circumstances, it seems probable that the numbers of the logic drawings listed on DXR were changed to some "family" number and that that is why drawing searches for the Prototype logics based on the DXR numbers have failed.

(a7) It should be noted that Exhibits 1 and 2 were made in the course of a regularly-conducted business activity at Digitronics.

(b) Exhibit 4 (attached) is a copy of the page of the wiring drawing number log book where I would expect to find records of the wiring drawings on Exhibit R (DK305-4 to DK305-40, DK305-42 to DK305-55, CK305-56, DK305-57 to DK305-63). But this page only contains the notation "DO NOT USE #305 THRU 999". It should be noted that Exhibit 4 was made in the course of a regularly-conducted Digitronics business activity.

(c) After 1962, there was no need for Digitronics to consult the Prototype drawings because the Prototype was no longer being demonstrated and there was zero interest in reproducing it.

(23a) PX100, the Hohmann TIM electrical wiring schematic, defines the interface between the TIM and the Prototype central data processor. It demonstrates that no interrogation signal is sent to the Hohmann TIM from the Prototype. It demonstrates that the TIM does not send a BID signal to the Prototype. It demonstrates that the Hohmann TIM did not have a rejection signal responsive means.

(23b) The interface plugs to the TIMs could have been used as the key to reconstruct those portions of the Prototype logic relevant to the patent in suit. It would not have been necessary to deal with the major areas of the logic concerned with odds and pool calculations and output display and printing. By working forward from the five data input lines from one TIM to the Prototype and thence to the scanning logic and TIM memory logic, it would have been easy to concentrate on reconstructing just <u>that</u> part of the logic, which constitutes only a minor fraction of the two racks which together contain 600 cards of logic. Racks 3 and 4 are almost exclusively taken up by power supplies and printer and display relays. (See Exhibit DXT4)

(23c) It should be noted that it would not have been necessary to trace any of the circuit cards plugged into the two racks of logic. This is so because the logic cards used

in the Prototype are standard cards described in existing Digitronics logic card documentation. Thus, it would only have been necessary to trace some of the wiring in the rear of the two logic card racks. The wiring in the rear of the logic racks interconnects the standard logic cards in such a fashion as to achieve the required Prototype logical functions. By proceeding as outlined above, it would not have been necessary, for example, to trace any wiring relating to pool computation, odds computation display control, or lister (printer) control.

(23d) The five TIM input data signals would have led to the data check logic (2-out-of-5). They would also have led to scan gates, which in turn would have led to the scan decoders, scan counters, and scan controls. They also would have led to the memory inputs and memory control logic.

(24) A well-defined, limited, orderly, and logical plan could thus have been set up for accurately determining the logical detail of those parts of the Prototype which are significant in this litigation. This would have taken detailed, careful, informed, intelligent work. Thus, the reconstruction of the relevant portions of the Prototype logic would have been a painstaking task, but it would certainly not have been "enormous" or excessively burdensome.

Robert L. Weida

Sworn to before me this
10th day of December, 1975

Maureen D Davidson

A1380

DG 467	Block Diagram (Uni-Dir Strip Reader) VOID			4/14/60	DFK
DG 468	" " (Bi-Dir " ")			STD	
DG 469	Univac Unit Data Ckts	UN1	4706	4/17/60	VdR
DG 470	" " Bad Tape Ckts	UN2	"	"	VdR
DG 471	" " Controls	UN3	"	"	VdR
DG 472	Selective Mark Comparison Sw'z for IBM Code		4552-3 4717	6/14/60	
DG 473	" " " " " (Excess 3 RCA 501 & Univac)		"	"	
DG 474	Block Diag. - Bi-Dir. Strip Reader VOID			4/24/60	DFK
DG 475	Logical " - " " Reel Paper Tape Reader Control			7/5/60	"
DG 476	Control Logic		4711	7/5/60	DG
DG 477	" Desk " - 2		"	"	"
DG 478	" " " - 1		"	"	"
DG 479	Odds Register (L1)		4726	7/4/60	DG
DG 480	" Function Table Part 1 (L2)				
DG 481	" " " " 2 (L3)				
DG 482	Place Accumulator (L4)				
DG 483	Accumulator Control Part 1 (L5)				
DG 484	Data Input - Part 2 Window Counter Memory Controls (L6)				
DG 485	" " " 1 (L7)				
DG 486	Memory Ckts. (L31)				
DG 487	Accumulator Controls Release Flip Flops (L8)				
DG 488	Win Pool Accumulator (L9)				
DG 489	" Accumulator (L11)				
DG 490	Show " (L12)				
DG 491	Odds Output Buffer (L13)				
DG 492	Memory Address Counter (L14)				
DG 493	Unit Adder (L15)				
DG 494	Memory & Addressing Control Pool Bd Ckts. L16				
DG 495	Clear & Input Controls Input Check Ckt L17				

Exhibit 1

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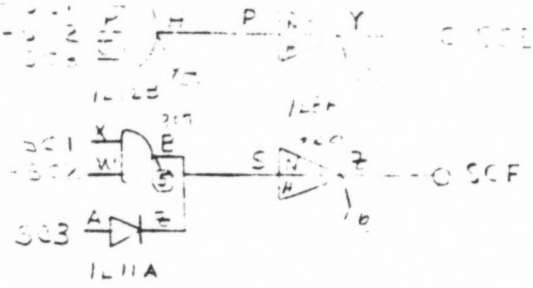
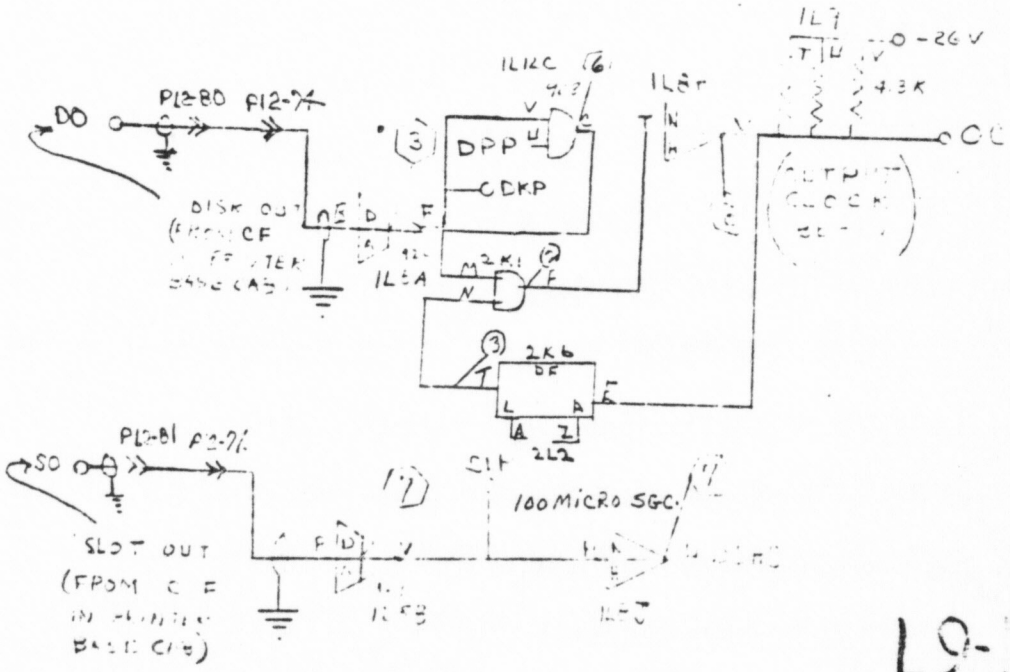
DG 496	Tester Controls	Tape 1	L 1	4726	7/16/60	DG.
DG 497	" "	" 2	L 1			
DG 498	" "	" 3	L 20			
DG 499	" Output	" 4	L 21			
DG 500	" "	" 5	L 22			
DG 501	" "	" 5	L 23			
DG 502	Odds Output Display Driver		L 24			
DG 503	Horse Number "	"	L 25			
DG 504	Place Output "	"	L 26			
DG 505	Show Output "	"	L 27			
DG 506	Win Output "	"	L 28			
DG 507	Memory Data Ckts.		L 29			
DG 508	Pool Adder		L 30			
DG 509	Scan Module (G4) Sht #2			4726	7/14/60	D
					7/18/60	DFR
BG 510	Control Logic (Fig 2)					
DG 511	Mag Tape Tape Converter Pulse & Case Shift Ckts		L 31	4703	7/14/60	DG.
DG 512	" Tape Control & Parity Ckts		L 2			
DG 513	Tape Converter Decoder Connections		L 4			
DG 514	" " Pluggable Ckts.		L 51			
DG 515	" " " "		L 52			
DG 516	Paper Tape Input Control		L 6			
DG 517	Patch Bd Ckts		L 7			
DG 518	Memory Address Counter		L 8			
DG 519	Case Shift & Parity Encoder		L 9-1			
DG 520	Information Encoder		L 9-2			
DG 521	Column Decoder		L 10			
DG 522	Mag & Paper Tape Input		L 11			
DG 523	Memory Output		L 12-1			
DG 524	" "		L 12-2			

A1382

DG 525	MAG TAPE CONTROL	213	4103	5/64	DG
DG 526	START STOP CONTROLS	214	"	"	"
DG 527	CHARACTER CONTROL	215	"	"	"
DG 528	FORMAT & MEMORY CONTROL	216	"	"	"
DG 529	CHARACTER CONTROL	217	"	"	"
DG 530	ENTER/EXIT CONTROL (MS)		4706	7/64	DG
DG 531	SELF CHECKING MODULE		4711		
DG 532	"				
DG 533	"				
DG 534	"				
DG 535	MS CHECKING MODULE				
DG 536	"				
DG 537	DUAL CONTROLLING CONTROL		4726	12/64	
DG 538					
DG 539	EQUAL COMPARISON		4711	7/64	DG
DG 540	(L. LOAD)	(214)	4443	5/64	DG
DG 541	TAPE CONTROL (MAG TAPE)	218	4718	5/64	DG
DG 542					
DG 543					
DG 544	BLOCK DIAGRAM CONTROL			5/64	DFK
DG 545	DIGIT DISPLAY		4711	5/64	DG
DG 546					
DG 547					
DG 548					
DG 549					
DG 550					
DG 551	[illegible]		4726	5/64	DG





MASTER COPY DG361

4550

DES.	DWN	CHK'D	APP'D	NO. DAT TR.

HEAT TREAT

	FRAC. ± 1/64	ANGLE ± 1/2°

DIGITRONICS CORPORATION

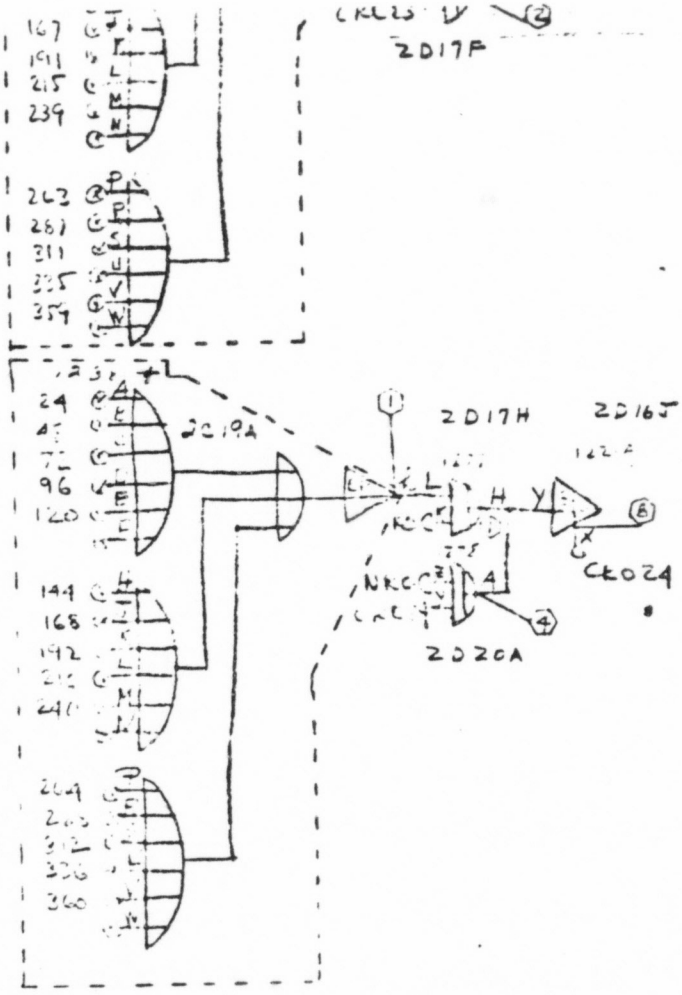
TITLE:

USED ON 4735

DG 500-11

Exhibit

A1384



L12-3

4549 DG 311

DIGITRONICS CORPORATION

DES.	DWN	CHKD	APP'D	NO.	DAY	YR

TITLE A/M [illegible] UNIT

USED ON 4736

DIAGRAM NO. DG 311-5

A1385

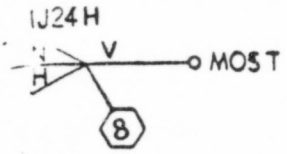
L16-1

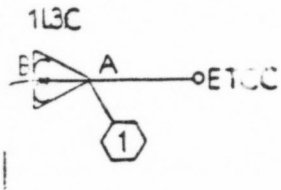
	DES	DWN	CHKD	APP'D	MO DAY YR	
HEAT TREAT						
DEC. ± .005	FRAC. ± 1/64	ANGLE ± 1/2				

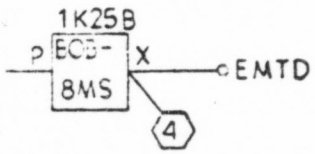
TITLE

4737

A1386

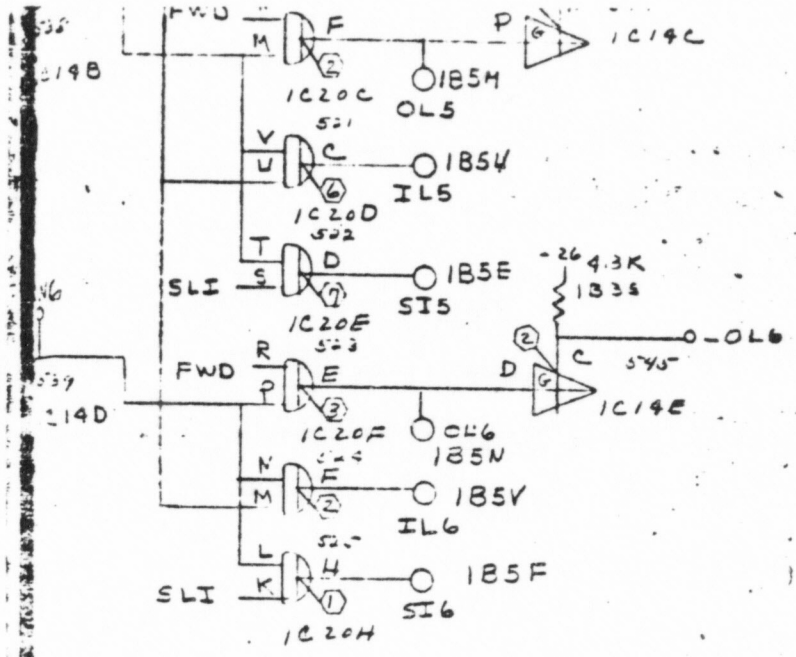






E.C.O.	DRN CHKD APP'D MO DAY YR	DIGITRONICS ALBERTSON NEW YORK
	SCALE	TITLE RCA. STYLUS PRINTER MEMORY LONGITUDINAL PARITY CHECK CIRUITRY L4-4
ES NO'S DEC ± .005	FRAC ± 1/64 ANGLE ± 1°	USED ON 4718 DRAWING NO DG 503-60

A1387



	DES.	DWN.	CHED.	APP'D.	NO. DAY YR.	
HEAT TREAT						
DEC. ± .005	FRAC. ± 1/64	ANGLE ± 1/2°				

DIGITRONICS CORPORATION

TITLE: A-M PRINTER CONTROLS
LOT PRINTER CONTROLS
ROW & COLUMN COUNTERS & DRIVERS

USED ON: 4717

DRAWING NO. DG 504-9

A1388

EJ

PE
4.3K

K18L
26

L11-1

	B	5-9-61	JED			
	A	1-1				

DES.	DWN	CHKD.	APP'D	NO. DAY YR.

HEAT TREAT

ES NOTED	DEC. ± .005	FRAC. ± 1/64	ANGLE ± 1/2

4549 DG-307

DIGITRONICS CORPORATION

TITLE: TAPE DATA (LINE FRINTER) INPUT CIRCUIT

USED ON: 4719

DRAWING NO. DG 505-1

2

TABLE OF DRAWING NUMBER CONFLICTS
BETWEEN DXR AND AM PRINTER CONTROLLER
LOGICS

DXR Drawing Number	Title	Conflicting Numbers	Conflicting Job Order Number	Sample Conflicting Drawing Number	Title
DG500	Lister Output	DG500-1,...,23	4735	DG500-11	AM Printer Control - Dot Printer Output
DG501	Lister Output	DG501-1,...,16	4736	DG501-5	AM Printer Control - Reordering Circuit for 360 Character Input
DG502	Odds Output Display Drivers	DG502-1,...,16	4737	DG502-11	Line Printer Memory Column Selection
DG503	Horse Number Display Drivers	DG503-1,..,19,60	4718	DG503-60	RCA Stylus Printer - Memory Longitudinal Parity Check Circuitry
DG504	Place Output Display Drivers	DG504-1,...,19,62	4717	DG504-9	AM Printer Controls - Dot Printer Controls Row and Column Counters and Drivers
DG505	Show Output Display Drivers	DG505-1,...,16	4719	DG505-1	Tape Data (Line Printer) Input Circuit

A1389

Exhibit 3

A1390

112

D-K294	W.D. UNI-DIRECT. READER P.B.	5006	5-21-62 RP
D-K295	W.D. PHOTO-DIODE HEAD	10027	5/28/62 RP
D-K296	ECON. READER WIRING DIAG.	10027	6/6/62 JMS
D-K297	FIELD DEFINITION & SCAN CONTROL BOARD SECT "A & B" (SH.1) "C & D" (SH.2)	4841	6/6/62 RP
D-K298	PHOTO DIODES HEAD W.D.	10027	6/8/62 BR
D-K299	W.D. ECONOMY READER, Mod .7500 N	10027	6/11/62 JMS
D-K300	HEAD CONNECTIONS PAPER TAPE W.D. WIRING DIAGRAM	10015	7-23-62 JMS
D-K301	UNI & BI-DIRECTIONAL TAPE READER MOD I	10082	8-16-62 LD
~~D-K302~~	~~Solenoid Wiring~~ (UNI-DIRECTIONAL)	10015	~~8/28/62 DPK~~
~~D-K303~~	~~——~~ (BI-DIRECTIONAL)	10015	~~8/28/62 DPK~~
D-K304	OPTIONAL COMPONENT WIRING	"	8-30-62 "

NO
DO
USE
2 OF THESE 999

Exhibit 4

IN THE UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK
----------x

DIGITRONICS CORPORATION, NOW
AMPEREX ELECTRONIC CORPORATION,

Plaintiff,

v.

Index No.
67 C 1119

THE NEW YORK RACING ASSOCIATION, INC.,
AUTOMATIC TOTALISATORS (U.S.A.) LTD.,
AUTOMATIC TOTALISATORS LTD. and
PREMIER EQUIPMENT PROPRIETARY LTD.,

Defendants.
----------x

AFFIDAVIT OF S. C. YUTER

STATE OF NEW YORK)
) ss.:
COUNTY OF NEW YORK)

S. C. Yuter, being duly sworn, deposes and says that:

(1) He is the attorney for plaintiff in the above-identified action and he makes this affidavit in support of the accompanying Plaintiff's Substituted Motion to Supplement and Amend Findings of Fact Pursuant to Fed. R. Civ. P. 52(b) and Plaintiff's Opposition to Defendants' Motion Under Rule 59(e) FRCP to Amend and Alter Judgment.

(2) In the course of his regularly-conducted law office activity, he wrote and mailed to defendants' attorney, Robert E. Isner, Esq., on October 2, 1974 a letter asking to be informed whether defendants intended to trace out the circuits of the demonstrator-prototype then stored at Atusa's offices in Delaware. Tracing of the circuits had been suggested by the Court during oral argument on June 19, 1974. A copy of that letter is attached and marked as Exhibit A.

(3) In the course of his regularly-conducted law office activity, on November 12, 1974, he received a letter from

Mr. Isner dated November 11, 1974, in response to the Exhibit A letter, in which Mr. Isner stated:

> In view of the testimony and admissions elicited to date concerning the correspondence between the structure and mode of operation of the demonstrator unit and the claims of the Weida patent, we do not intend to trace out the circuits of such unit for use at the trial.

A copy of that letter is attached and marked Exhibit B.

(4) The Exhibit B statement by Mr. Isner that defendants intended to rely on testimony and admissions elicited during discovery rather than to trace out the circuits of the demonstrator led plaintiff's attorney to conclude that there was no need to locate the missing demonstrator-prototype drawings.

(5) He made a determined, though unsuccessful effort, to locate the missing drawings of the central equipment of the demonstrator. Well over 100 hours were spent, many with defendants' counsel, searching for generally relevant documents through Digitronics' original documents as well as copies of Roosevelt documents. While many relevant documents were discovered, none pertained to the demonstrator drawings. That search was conducted at IOMEC Corporation (the successor-in-interest of the Digitronics business and records) in Southboro, Massachusetts, at Roosevelt Raceway's files at their counsel's storage facility in Brooklyn, New York, at Roosevelt counsel's offices in Manhattan and at Roosevelt Raceway itself. The search at IOMEC was done with defendants' counsel present, as was the search in Brooklyn. The parties independently searched the documents at the office of Roosevelt Raceway's counsel.

(6) Defendants were given carte blanche to search through Digitronics' files (except for privileged documents), and spent four days searching at Digitronics' Albertson Plant in March 1972; see Giardino Affidavit, Appendix 5, page 1, paragraph 2.

(7) In connection with the effort to discover the circuitry of the prototype, Roosevelt Raceway's attorneys responded to a letter from plaintiff dated February 11, 1974, in part as follows:

> 1. As to the "prototype of an electronic totalizator" referred to in Subparagraph (1) of your letter, I am advised that Roosevelt Raceway has searched for the same, but, it does not have it and does not know where it is.

That letter was copied to defendants' attorneys. A copy is attached and marked Exhibit C; it was received by plaintiff's attorney in the course of his regularly-conducted law office activity. Appendix 5, page 2, paragraph 3a of the Giardino Affidavit reveals that defendants knew where the prototype was as early as June 8, 1972. But they did not disclose that to plaintiff until the oral argument of June 19, 1974.

(8) In support of defendants' request to change the judgment and award attorneys fees, Mr. Alfred Giardino, general counsel of Atusa and related companies, in paragraph 3 of his affidavit, states his view in August 1971 that there was no infringement. But their just-discovered internal Memorandum dated January 11, 1972 reveals at page 6 their internal opinion that as "to claim 20, we probably do infringe the literal terminology of the claims...." A copy of that Memorandum is attached and marked Exhibit D.

(9) Mr. Giardino's Affidavit, paragraphs 4 and 8, allege that defendants permitted plaintiff's representatives to acquaint themselves with the NYRA Tote in October 1971. He neglects to add that copies of the NYRA Tote drawings were not made available at that time for detailed study of that most complicated system. Actually, defendants did not make their PDP-8 and NYRA Tote experts available for oral depositions until December 5, 1975. See attached defendants' letters dated

June 5, 1974 and November 27, 1974, marked respectively as Exhibits E1 and E2. Until December 1974, plaintiff did not have enough infringement discovery to make a final determination of the infringed claims.

(10) Mr. Giardino asserts, in his affidavit paragraph 13, that it was irresponsible and a serious abuse of the judicial system for plaintiff to await the commencement of trial (i.e., the completion of discovery) before dropping all claims except claims 20-27. The dropped claims include claims 1-19 which defendants correctly call "Data Processor Claims", as distinguished from "Totalisator Claims" (claims 20-30), in Mr. Giardino's Appendix 6, page 1; claim 1 is described on pages 3-4 and their theory of noninfringement on page 5.

(11) Prior to dropping the data processor claims 1-19, plaintiff had concluded that a credible argument could be made for infringement of some of these claims, especially claim 1, by the NYRA Tote, but that the risk of loss outweighed the additional trial time which would have been involved with respect to trying validity and infringement of a completely different invention from that defined by the totalisator claims 20-27.

(12) With respect to defendants' claim for attorneys fees, Appendix 1, page 2 of the Giardino Affidavit discloses that it was the defendants that initiated discovery in the midst of settlement negotiations. At that time plaintiff was trying to conserve attorneys fees; see the letter to Mr. Giardino from plaintiff's Russell G. Pelton, Esq., dated October 6, 1971, page 2, attached as Appendix 2 to Mr. Giardino's Affidavit. And their ill-founded $6,000,000.00 antitrust counterclaim (Giardino Affidavit, Appendix 7, page 2) unnecessarily increased attorneys fees.

(13) With respect to the Westbury brochure, plaintiff has always been of the opinion that it just cutlined the hoped-for results and did not disclose any claimed invention because it did not disclose means in sufficient detail to teach a skilled person to practice any claimed invention. In plaintiff's view such means have to be comparable in detail to that of the Weida patent specification. The contrary opinion of the Court, however, should not provide a basis for a finding of an exceptional case justifying attorneys fees, because plaintiff's opinion was and is based on a good faith judgment of its attorney.

(14) Each of the statements of fact in the accompanying Plaintiff's Opposition to Defendants' Motion Under Rule 59(e) FRCP to Amend and Alter Judgment and Plaintiff's Substituted Motion to Supplement and Amend Findings of Fact Pursuant to Fed. R. Civ. P. 52(b) is true, or, on information and belief, is believed to be true.

S. C. Yuter

Sworn to before me this
10th day of December, 1975
Maureen Davidson

26

A1396

F

LAW OFFICES
YUTER & ROSEN

S. C. YUTER, J. S. D.
DANIEL M. ROSEN

P. G. HILBERT
(DISTRICT OF COLUMBIA BAR ONLY)

OF COUNSEL
C. P. SPIECENS

Patents · Trademarks

605 THIRD AVENUE · NEW YORK 10016
(212) 986-1221
CABLE: YUTERLAW

October 2, 1974

Robert E. Isner, Esq.
Nims, Howes, Collison & Isner
60 East 42 Street
New York, N.Y. 10017

Re: Digitronics Corp. v. The New York Racing Association, et al, Civ. Action 67 C 1119

Dear Bob:

I understand that defendants have acquired custody of the demonstrator (what you call the "prototype") from Roosevelt Raceway and that it is presently stored at Australian Tote's offices in Wilmington, Delaware, but that no circuit drawings were located. Please let me know whether or not defendants intend to trace out the circuits for use at the trial, as suggested by Judge Dooling. If so, we would want sufficient time before the trial to check such circuit diagrams to see if they are accurate -- rather than having to consume valuable time at the trial arguing about it.

Mr. Robert L. Weida, the principal inventor of the all-electronic totalisator covered by the patent in suit, has scanned the old Digitronics microfilm reels your Ken Dusyn and I located at Iomec's offices in Southbury, Mass. At my request, Mr. Weida was looking for drawings relating to the demonstrator. He located only one drawing and there were no others on that reel. The drawing is No. D-C 672 and is entitled "Indicator Display Panel Assembly." I would be pleased to lend you the microfilm reels for your own inspection.

In reviewing a secondary file of the patent application for the Digitronics ticket issuing machine (Patent No. 3,255,692 -- not in suit), I discovered three additional photographs made by Mr. Ernst (Nos. 3592/8-10) which show the inside of the Digitronics ticket issuing machine. Also a

Exhibit A

Digitronics drawing entitled "Schematic-Daily Double Ticket Issuing Machine." Also a drawing apparently prepared by American Electronics (who designed the machine) entitled "Ticket Issue Time Layout." I contacted Mr. Ernst about the "3592" photos to see if there were any more. He said there were and is making copies for me. As soon as they are received, I will call you.

In the meantime, you are welcome to inspect and copy all of the above-mentioned drawings and photos.

Sincerely,

SCY:d

cc: Hon. John F. Dooling
Hon. Max Schiffman
Russell G. Pelton, Esq.
James A. Flynn, Esq.

A 1398

NIMS, HOWES, COLLISON & ISNER
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RALPH HENKLE
KENNETH R. UMANS
PETER J. FRANCO
JAMES MONTALTO

November 11, 1974

S. C. Yuter, Esq.
605 Third Avenue
New York, New York 10016

Re: Digitronics Corp. v. The New York Racing Association, et al, Civil Action 67 C 1119
Docket 10817

Dear Sy:

This is a belated reply to your letter of October 2nd.

In view of the testimony and admissions elicited to date concerning the correspondence between the structure and mode of operation of the demonstrator unit and the claims of the Weida patent, we do not intend to trace out the circuits of such unit for use at the trial.

With respect to drawing no. D-C 672, I am looking forward to examining the same and would appreciate your keeping the particular microfilm in which it appears available for my inspection.

The recent location of additional Ernst photographs of the Ticket Issuing Machine as well as the noted drawings therewith is of great interest. Not only are the three Ernst photos (Nos. 3592/8-10) of considerable interest, but the additional photos as transmitted to me with your letter of October 11, 1974 and marked PX71-PX85 are of much greater interest. I am taking steps to secure a duplicate set thereof from Mr. Ernst.

Apart from the foregoing, I would like to inspect the various materials identified in your October 7, 1974 letter and

Exhibit B

will be in touch with you shortly as to a convenient time therefor.

Very truly yours,

Robert E. Isner

REI:mjh
cc: John F. Dooling, Jr., USDJ
Honorable Max Schiffman
James Flynn, Esq.
Russell G. Pelton, Esq.

A1400

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NORMAN L FABER
HERBERT F GALLAGHER
JOHN J HAMILTON
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202 331-8565

March 15, 1974

Sy Yuter, Esq.
Yuter & Fields
605 Third Avenue
New York, N. Y. 10016

Re: Digitronics Corporation v. New York Racing Association, et al

Dear Mr. Yuter:

Roosevelt Raceway has asked me to answer and handle the documentation involved in connection with your letter to Mr. Fosner of February 11, in connection with the above litigation in which you are engaged.

Answering said letter, we advise as follows:

1. As to the "prototype of an electronic totalizator" referred to in Subparagraph (1) of your letter, I am advised that Roosevelt Raceway has searched for the same, but, it does not have it and does not know where it is.

2. Correspondence covered by Item (2) of your letter has been forwarded to me which you may examine at our office under the conditions and reservations heretofore obtained in connection with your examination of our files.

3. Item (3) of your letter asks for earlier Roosevelt's efforts (1961) to obtain or build an electronic tote. As to this, if you have any specific knowledge of any such efforts and can identify the party involved, Roosevelt Raceway will make a search

Exhibit C

to find out whether it has any correspondence or documentation in connection with your specifications. However, Item (3) as presently phrased is just too broad and would result in a burdensome search.

4. I have correspondence forwarded to me re your Item (4) which you may examine as per Item (2) above.

5. As to Item (5) which covers, "All reactions of the racing industry to the electronic tote of the type indicated by the attached copies of letters from the Buffalo Trotting Association and the Milnerton Turf Club", our response as to Item (3) above, is applicable.

Please advise Miss Auleta, of our office, when you or Mr. Isner may want to examine the documentation we have at hand re the above.

We assume that as per past practice, we will be compensated our time and expenses in complying with your request. We do not know if Mr. Isner's client is obligated for 50% of the same as per our past relations. If not, we will look to you nad your client to pay us 100% of our invoice for the same.

Sincerely,

John Howley

JH:mb

cc.: Robert E. Isner, Esq.
Mr. S. Harvey Fosner
The Hon. Max Schiffman

P.S. We also have the Weil examination for you.

C

A1402

Memorandum re: ATL position vs. Weida U.S. Patent
as asserted at joint conference on
January 11, 1972

I. - General

The Weida claims conveniently break down into three relatively distinct groups -

1 - Duplex computer;

2 - Broad system;

3 - Detailed system.

Each will be separately considered.

1. - Duplex computer claims 1-19.

The NYRA system has two basic points of difference over the Weida system.

In the NYRA system the "slave" unit monitors system operation and is responsible for switchover in the event of system failure, whereas in the Weida system the master unit not only performs all required tote functions but also determines its own errors and effects switchover. This is of particular significance in that the claims of the Weida patent specifically places the error location and switchover control function on the master and thus describes and claims the obverse of the NYRA system. More specifically, the Weida master unit controls the operation of the calculator from the data obtained from the TMS and in addition, performs the basic switchover control function. In contradistinction,

Exhibit D

in the NTRA system, the master unit performs the basic data receipt and processing function but does not perform the specified control function.

The second point of basic difference is that the Weida unit effects a transfer control from the master to the slave upon determination of an initial error in the master unit; whereas in the NTRA system, an accumulation of 64 separate errors is required before a change in control function is effected. Normally, the 64 error changeover will require a relatively long period of time, approximately several hours and through internally produced information, the source of the individual errors can normally be corrected before switchover occurs. In Weida, however, switchover occurs on the first error, thus permitting no tracing or correction.

There is thus a basic difference in the philisophical design approach and consequent mode of operation between the two systems. If the Weida patent claims are to be expanded as to render effectively meaningless any operational connotations between the words "master" and "slave", then the scope of the claims is expanded and the area of pertinent art becomes equally expanded so as to render the claim invalid.

Viewed in another aspect, another fundamental difference lies in the fact that, in the Weida system, the master unit

D

is required to sense an error within its own mechanisms and then institute a change of control, which is essentially a self-auditing system. In contradistinction, the NYRA unit uses the auxiliary or slave unit to check the operation of the master unit which is handling the basic data etc, and is essentially an independent auditing system.

A further point to be noted is that even if the Weida and NYRA systems are similar in the sense that they both have a plurality of pairs of units each performing a certain number of"the same functions", another difference in the NYRA unit is that both the master and slave perform additional functions not performed by the other. While these points may not be of prime importance to the question of infringement, it could become of greater importance of the companion issue of validity and particularly under Section 112, - indefiniteness or ambiguity - i.e., is complete or only partial coincidence of function required.

D

BEST COPY AVAILABLE

As a conclusion to our discussion of the duplexing claims, a brief presentation was made as to the nature of the Bell ESS system installed at Morris, I.. in 1959/60. In its broad aspects, this system appears to be the same as the duplexing system claimed in the Waida patent. During the course of this discussion, Yutor indicated that they were of the belief that this system (a) was never installed and/or (b) was not a duplexed system. This was apparently based on oral information received from some unidentified Bell employees.

We agreed to make available certain publication material showing both the fact of system installation and the duplex nature thereof.

D

II. - Claims 24 through 34 - Detailed tote system claims

These claims are of generally detailed character and are directed to a "system" made up of a ticket issuing machine and a data processor.

Insofar as these narrower scope "system" claims are concerned, there exist specific differences between the modes of operation of components of the NYRA unit and the pertinent operative steps specified in the claims which permit non-infringement arguments to be presented. Essentially, the basic areas of departure involve differences in the nature of data transmission from the TTMS to the computer, including the use of a common set of output lines and a six-bit code as distinguished from twelve lines from each TTM; a cascaded scanning system which does not "sequentially and periodically" select each of the ticket issuance machine for interrogation as disclosed in Weida; and the non-use of any interrogation signal emanating from the scanner to the TTM in the operating sequence.

Certain claims in this grouping are directed to particular error test procedures which are also not employed in the NYRA unit (claims 27 and 28) and to specific procedures for handling daily double transactions, which are also not employed in the NYRA system (claims 31, 32 and 33).

Apart from the non-infringement, most if not all of this claimed subject matter, if broadly construed to cover the

D

LYDA unit, is probably invalid for anticipation or for obviousness over the old electro-mechanical tote system procedures as embodied for example in the Handley patent.

III. - Claims 20-23

These claims constitute the broadest claims in the patent and are essentially directed to the combination of a ticket issuing machine and a data processor.

As to claim 20, we probably do infringe the literal terminology of the claims in that - Items (A) and (C) broadly describe, respectively, a conventional ticket issuing machine and a conventional calculator; and Item (B), i.e., the "generating means", is so broadly stated as to cover almost any mode of operation.

However, while there may be some difference in the specific mode of operation of the LYDA unit with respect to the particular "generating means" employed, the language of the claim is so broad as to be completely anticipated by the Handley patent. Our basic position therefore with respect to this claim is one of invalidity.

Claim 21 (dependent upon claim 20) does nothing but present, in conventional computer component language, how an electronic computer functions. Comparable functions, insofar as end results are concerned, were performed in the old electro-

mechanic units and the specific operations referred to are performed in any computer in the handling of any type of data.

Claim 22 is a further dependent claim on claim 20 and is not infringed since the NYRA unit does not employ a ticket issuing machine memory in any form.

Claim 23. - This claim is directed to the combination of a ticket issuing machine associated with particular data processing system elements. As to item (B), we do not employ "non-allowed" signals, as per the claim terminology, but rather achieve the same end result by computer operation.

Conclusion

The Weida system and the subject matterdelineated by the claims (and in general relation to the breadth of claim) is essentially the same as that employed in the electro-mechanical units as per the Handley patent. Also the ticket issuing unit described in Handley was similar in function and mode of operation to that of ATL J 10 ticket issuing machines which were provided to Digitronics in the early stage of development of the Weida system.

To counter the above, Digitronics argued that the Examiner, in granting the Weida patent, knew of Handley because Handley was cited against some of the patents that were cited by the Examiner in opposition to Weida. In fact, Handley was not cited by the Patent Office as a matter of law and Digitronics was just grabbing at straws with such an argument.

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A1409

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JAMES MONTALTO

(212) 682-4590
CABLE NIMS

June 5, 1974

S. C. Yuter, Esq.
Yuter & Rosen
605 Third Avenue
New York, N.Y. 10016

Re: Digitronics Corp. v.
The New York Pacing Association et al.
Civil Action 67 C 1119
Docket 10017

Dear Sy:

As a follow-up to the last Dodwell deposition session, inquiry has revealed that Mr. Pelletier is now back in Germany and that the programmer, Mr. Lee, can be made available here in New York on about a week's notice. Mr. Lee's availability, however, will have to be made subject to change of date in the event that some crisis arises which will require his presence elsewhere.

Very truly yours,

Robert E. Isner

REI/kl
cc Honorable Max Schiffman
Russell G. Pelton, Esq.
James Flynn, Esq.

Exhibit E1

A1410

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(212) 682-4590
CABLE: NIMS

November 27, 1974

S. C. Yuter, Esq.
605 Third Avenue
New York, New York 10016

Re: Digitronics Corporation v. New York State Racing Association et al.

Dear Sy:

In response to your telephone request of November 26th for prospective deponents for infringement discovery, this will confirm that we will make Bob Pelletier available at 10:00 a.m., December 5, for the PD-P8 subject matter and will have Ken Schroer available for possible testomony on the NYRA unit at 2:00 p.m. that afternoon.

Very truly yours,

Robert E. Isner

REI:cf
cc: Hon. John F. Dooling, Jr.
Hon. Max Schiffman
James A. Flynn, Esq.
Russell G. Pelton, Esq.

Exhibit E2

IN THE UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK
- x

DIGITRONICS CORPORATION, NOW
AMPEREX ELECTRONIC CORPORATION,

Plaintiff,

v.

Index No.
67 C 1119

THE NEW YORK RACING ASSOCIATION, INC.,
AUTOMATIC TOTALISATORS (U.S.A.) LTD.,
AUTOMATIC TOTALISATORS LTD. and
PREMIER EQUIPMENT PROPRIETARY LTD.,

Defendants.

- x

PLAINTIFF'S OPPOSITION TO DEFENDANTS' MOTION UNDER RULE 59(e) FRCP TO AMEND AND ALTER JUDGMENT

Plaintiff opposes defendants' Motion Under Rule 59(e) FRCP to Amend and Alter the Judgment for reasons including those which follow.

Plaintiff waives its right to respond orally to defendants' oral argument made November 6, 1975 in support of its motion; so no additional hearing need be required.

A1412

I. RE REQUEST THAT THE JUDGMENT BE AMENDED TO INCLUDE A POSITIVE RECITATION OF PATENT INVALIDITY DUE TO IMPROPER INVENTORSHIP UNDER 35 U.S.C. 101.

The Court found that "Claims 20-22 read on the Demonstrator-prototype; the contention that the Demonstrator-prototype did not exhibit a plurality of TIMs is unsubstantial...." (Finding of Fact 43, p. 17.) "Inevitably, the prototype or demonstrator is prior art of other inventors against the patent in suit" (Memorandum p. 63, lines 10-11) suggests that Claims 20-22 are held invalid under 35 U.S.C. 102(g) and not 35 U.S.C. 101.

Section 102(g) states that a person shall be entitled to a patent unless -- "before the applicant's invention thereof the invention was made in this country by another who had not abandoned, suppressed or concealed it." Section 103 refers to Section 102 and not Section 101, as defining the prior art.

Section 101 states:

> "Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title."

35 United States Code Annotated 172-173, Historical and Revision Notes, states that Section 101 relates to the subject matter for which patents may be obtained and Section 102 defines statutory novelty and states other conditions for patentability.

Section 102(g) is the prior art condition and requirement on which the Court appears to have relied in invalidating Claims 20-22 on the basis of the prototype. There being no substantive difference in the judgment of the Court, there was no novelty defined by Claims 20-22 over the prototype.

35 U.S.C. 111 requires that the application shall be made by the inventor and shall include a specification and an oath by the applicant as prescribed by Section 115. Section 115 states that the "applicant shall make oath that he believes himself to be the original and first inventor...." In the Weida application (Exhibit 2, p. 68) the oath states, in pertinent part, that "we have read the foregoing specification and claims and we verily believe we are the original, first, and joint inventors of the invention or discovery in "DATA PROCESSING SYSTEM" described and claimed therein." (Emphasis added.) It is the Westbury Tote and not the prototype that is described in the specification and it is uncontroverted that the named patentees believed that they had invented the Westbury Tote. Section 101, if applicable, should be satisfied if they did not lie in expressing their belief.

It is a condition of patentability of Section 102 on which the Court is believed to have relied in invalidating Claims 20-22, specifically prior invention under Section 102(g), not Section 101.

II. RE REQUEST THAT THE OPINION AND FINDINGS OF FACT SET FORTH THAT THE CLAIMS IN SUIT WERE INVALID BECAUSE THE SUBJECT MATTER THEREOF WAS "ON SALE" UNDER 35 U.S.C. 102(b), IN ACCORD WITH THE RECENTLY ENUNCIATED CONTROLLING LAW OF THE SECOND CIRCUIT.

With respect to the "on sale" issue, the Court found as follows (at Memorandum, pp. 64-65):

> [T]he demonstrator or prototype was not practically operable as a racetrack totalisator; it was a demonstrator only; not a toy, not a model; it was a full scale demonstrator and it was meant to be used and was used first as a demonstration to Roosevelt Raceway and, later, as a demonstrator for Westbury in its sales efforts; it had been hoped it might be used to get state approval of the full sized totalisator of Exhibit 94B (Exhibit AP, Exhibit B), but that was not accomplished. But neither such "sale" as there was of the prototype (and nothing turns on the inept effort to rewrite the contract, Exhibit AP), nor such use as was made of the prototype as a demonstrator, reached the disabling level that 35 U.S.C. 102 marks as being "in public use or on sale in this country." The sale was not on commercial terms for the ultimate use to which the projected finished product would be devoted, not was the use, if public, a use of the article of the patent rather than a use of an illustrative but commercially incompetent prototype of the article of the patent, and it was not a use for the purposes to be served by the article of the patent but a use in order to demonstrate the validity of the scheme of the article of the patent. Cf. Cali v. Eastern Airlines, Inc., 2d Cir. 1971, 442 F.2d 65, 70-71; In re Yarn Processing Patent Validity Litigation, 5th Cir. 1974, 498 F.2d 271, 277, 282-285; Jack Winter, Inc. v. Koratron Co. Inc., N.D.Cal. 1974, 375 F.Supp. 1, 37.

And at pages 66-67:

> [T]here can be a sale of future goods that is disabling under Section 102(b) if the article is one that in ordinary trade would be sold as future goods to be built and if, at the time of contracting, it is sufficiently defined, provided, at minimum, it has been reduced to practice in some reliably, complete manifestation. Can it fairly be said that the First Totalisator

was on sale a year before the filing of the patent application drawn from the First Totalisator as it was completed and before it was publicly demonstrated? Cf. Jack Winter, Inc. v. Koratron Co., Inc., supra, 375 F.Supp. at 37; Kalvar Corp. v. Xidex Corp., N.D.Cal. 1973, 384 F.Supp. 1126, 1130-1138; Philco Corp. v. Admiral Corp., D.Del. 1961, 199 F.Supp. 797, 814-818. Contrast Burke Electric Co. v. Independent Pneumatic Tool Co., 2d Cir. 1916, 232 Fed. 145, 146-147, 234 Fed. 93. Robbins Co. v. Lawrence Mfg. Co., 9th Cir. 1973, 482 F.2d 426, 431-433, may be taken to suggest that in the case of a sale of future goods to be built to specification, where there is no fully operative device in existence, a finding that the article of the patent had been put on public sale could rarely be warranted. The history of the "sale" of the First Totalisator does not reach any of the uncertain benchmarks that the cases seem to limn. Roosevelt Raceway's shilly-shallying, the cutback in scale, the groping for cost savings and for a ceiling on costs that kept running out of hand, these fluid factors combine to preclude a finding that there was an August 1961 contract to sell the First Totalisator as an article complete in design, specification and detailed drawings and adequately exemplified as a feasible device by the prototype. Without such a finding, it cannot be held that there was a disabling contract to sell within the meaning of 35 U.S.C. 102(b).

In Timely Products Corp. v. Arron, 187 USPQ 257 (2d Cir. 1975), cited as recently enunciated controlling law of the Second Circuit, three requisites must be present to establish a Section 102(b) bar. Requisite (2), at 187 USPQ 268, is that the "invention must have been tested sufficiently to verify that it is operable and commercially marketable."

Since the Court found that the prototype was "commercially incompetent" and there was "no fully operative device in existence", Timely Products provides still further authority that there is no Section 102(b) bar.

III. RE REQUEST THAT THE PATENT BE HELD TO BE UNENFORCEABLE, THE CASE BE HELD TO BE "EXCEPTIONAL" UNDER 35 U.S.C. 285 AND REASONABLE ATTORNEYS FEES BE AWARDED TO DEFENDANTS.

With respect to the fraud and attorneys fees issues, the Court found (at Memorandum, pp. 213-215):

> [T]he evidence does not support a finding that there was conscious wrongdoing or witting non-disclosure of what plaintiff knew or should have known was germane to the prosecution of the application. A too cavalier assumption that plaintiff could farm out to Spiecens the job of preparing a hurried application that could be filed and wrangled out later on in the Patent Office there may have been. There was a chilling disregard of the principle that it is individual human inventorship only that the patent law recognizes and not corporate ownership of technical talent and the technical men's derisory "rights" to file for patents on their inventions. Here, the evidence is that Spiecens dealt with the "inventors" orally, worked from shop drawings, schematics, block diagrams etc., and, evidently, neither felt that he had to, nor did dig into the background. He was filing on the system just completed, and the walkover prosecution did not occasion any return for client conferences that would have exposed the roots of the system his specification described and his claims outlined. It does not appear that Leonard or Weida or any management personnel withheld anything against Spiecens's inquiry or suppressed anything which Spiecens thought he needed or which management feared might become a threat to successful prosecution. The overall impression is that the filing was not a matter to which management attached any importance or to which it adverted after authorizing the filing. The conscious misdealing with the Patent Office or the reckless neglect of disclosure responsibilities required by the authorities were not present. Cf. Carter-Wallace, Inc. v. Davis-Edwards Pharmacal Corp., 2d Cir. 1971, 443 F.2d 867, 881-883.
>
> It is, therefore, concluded that the patent was not obtained through any fraud on the patent office, and, that, although plaintiff's management of the prosecution was characterized by a foolish unconcern, a want of proper managerial and technical supervision, and an improperly broad

delegation of responsibility to an inadequately instructed patent solicitor, plaintiff did not act in bad faith in prosecuting the patent as it did, or consciously breach its duty to the patent office.

It follows that the case is not within Walker Process Equipment, Inc. v. Food Machinery & Chemical Corp., 1965, 382 U.S. 172.

There remains the question whether defendants are entitled to reasonable attorneys fees under 35 U.S.C. 285. The case has been pending for about eight years and the trial consumed twenty-five days. Nevertheless it cannot be said that the case was pursued in bad faith, or was so wholly devoid of substance that plaintiff cculd not fairly be supposed to be proceeding in good faith. Cf. Kahn v. Dynamics Corp. of America, 2d Cir. 1975, 508 F.2d 939, 944.

Defendants rely on the Timely Products case and Kramer v. Duralite Company, Inc., 185 USPQ 641 (2d Cir. 1975) in seeking a reversal of the Court's judgment that defendants are not entitled to an award of attorneys fees.

In Kramer, the patentee was found to have lied at trial, and similarly misled the Patent Office, when he stated that he was the sole inventor of the disclosed hinge bracket.

In Timely, the patentee, Arron, filed an affidavit in the Patent Office swearing that his invention was conceived prior to the filing date of a Costanzo patent (187 USPQ 263). The Patent Office then withdrew its rejection on the Costanzo patent and allowed the Arron patent. In the

affidavit, Arron stated that he had been "associated with another" in his work prior to Costanzo's filing date, without mentioning that Costanzo himself was the other person referred to.

The Court of Appeals stated, in pertinent part, that (187 USPQ 264):

> In choosing the awkwardly noncommital expression "another" to refer to Costanzo, he surely was consciously withholding from the Patent Office a fact which he believed, for obvious reasons, might be considered relevant to his claim of priority over Costanzo.
>
> The affidavit produced the desired result: the examiner withdrew Costanzo as a reference and concurrently or shortly thereafter allowed the Arron application ....
>
> Arron concealed from the Patent Office not only the fact that Costanzo was the person who had cooperated in his work prior to Costanzo's filing date; he concealed the even more important facts that the sock disclosed and claimed in Costanzo's patent had been conceived, reduced to practice and even offered for sale before he (Arron) started work on his alleged improvement, and that he knew all about the Costanzo sock and used it as the point of departure for his work. Thus he was well aware that, even though he might be able to swear back of Costanzo's filing date, he could not antedate the Costanzo's invention. (Original emphasis.)

After a detailed review of the "public use" and "on sale" law in the Second Circuit and elsewhere, the Circuit Court concluded (187 USPQ 267) that Section 102(b) bars an application for patent filed more than one year after the solicitation of an order for a specific article to be produced later, where the following requisites are present: (1) The complete invention claimed must have been embodied in or obvious in view of the thing offered for sale. (2) The invention must have been tested sufficiently

to verify that it is operable and commercially marketable. (3) The sale must be primarily for profit than for experimental purposes.

Defendants argue that the demonstrator or prototype satisfied the Timely criteria for "on sale" and the fact that the Patent Office was not informed of that by patentees, per se, dictates an award of attorneys fees. No case has ever gone that far, and certainly not Timely where a conscious misleading representation under oath was found. But there is no "on sale" bar to begin with. See Section II above.

In terms of the Timely criteria, the invention had not been tested sufficiently to verify that it was operable and commercially marketable. Nor can it fairly be said that any sale or public use of the demonstrator was primarily for profit rather than for experimental purposes. Westbury was invoiced for $150,000, but the total material cost and labor charges were stated to be $158,478.31. (Memorandum, p. 30)

With respect to any sale of the First Totalisator, the Court found that there was "no fully operative device in existence." (Memorandum, p. 67)

In Kramer, as indicated above, the patentee was found to have lied at trial, and to have similarly misled the Patent Office when he stated that he was the sole inventor of the disclosed hinge bracket. Here, it is uncontroverted that the patentees honestly believed that they invented the claimed inventions in the First Totalisator, the Westbury Tote, described in their specification. See Section I above.

Defendants rely only on the finding of lack of inventorship of the

broad totalisator claims 20-22. They do not question the patentees' belief that they invented the subject matter of claims 1-19 and 23-33. In order to establish an exceptional case justifying an award of attorneys fees, Kramer should be limited to lying about the inventorhsip of the total subject matter described and claimed. But, in any event, there is not one iota of evidence controverting the patentees' belief that they invented the subject matter of claims 20-22. On the contrary, there is a total failure of proof of the reasonable certainty of a deliberate misrepresentation, which is required to justify an attorneys fees award.

Moreover, for the limited purpose of determining that this is not an exceptional case, the patentees' oath should be assessed in the light of 35 U.S.C. 112, paragraph 3, which limits the means clauses of the claims to the structure described in the specification and equivalents thereof. That structure is the Westbury Tote, not the prototype, and the patentees correctly believed that they had invented the Westbury Tote.

Defendants buttress their request for a reversal of the denial of an award of attorneys fees by citing the missing demonstrator drawings and questioning Digitronics' candor during the discovery phase of this action.

First, defendants are hardly in a moral position to question Digitronics' candor in view of the Roosevelt letter of March 15, 1974, copied to defendants' counsel, stating that Roosevelt "does not have the prototype" and "does not know where it is." See the accompanying Yuter affidavit dated December 10, 1975, Exhibit C. Mr. Giardino's affidavit,

"Appendix 5", page 2, discloses that defendants discovered the prototype at Roosevelt in June 1972. Defendants did not disclose that they had the prototype until the oral argument on June 19, 1974. But in March 1974 they knew where it was and didn't tell Digitronics. (Yuter affidavit, par. (7))

Second, Digitronics made a determined effort to locate the missing drawings of the central equipment of the demonstrator. (The Hohmann TIM circuit drawing was found, Ex. 100). More than 100 hours were spent searching through Digitronics' original documents as well as Roosevelt documents for relevant documents, including a document that might have led to the missing drawings. That search was conducted at Iomec in Southboro, Mass. (the successor to the Digitronics business to which all drawings were transferred), and among Roosevelt's files at their counsel's storage facility in Brooklyn, at their counsel's offices, and at Roosevelt Raceway itself. (Yuter affidavit, par. (5)) That surely was a good faith discovery effort.

Third, defendants were given carte blanche to search through Digitronics files (except for privileged documents) and spent four days searching at its Albertson plant in March 1972. (Yuter affidavit, par. (6)) Additional searching was done jointly. (Yuter affidavit, par. (5))

Finally, in November 1974, defendants elected to rely on the testimony and admissions elicited during discovery rather than trace out the pertinent circuitry of the prototype then in their possession. The Court during the June 19, 1974 hearing had suggested tracing of the circuits. (Yuter affidavit, pars. (2) and (3, Exhibit B)) With defendants willing to

rely on the discovery, plaintiff concluded that there then was no need to discover the missing drawings. (Yuter affidavit, par. (4))

In view of the above history, defendants' recourse to the missing drawings of the central equipment of the prototype only serves to underscore the weakness of their argument seeking reversal of the denial of their request for attorneys fees.

Defendants suggest that plaintiff's suit was an abuse of process because there was no infringement. But a just-discovered internal memorandum of defendants reveals that they believed they infringed the patent, specifically claim 20. (Yuter affidavit, par. (8), Exhibit D) Moreover, the Court rejected defendants' arguments of noninfringement (nonperiodic sequencing and nonsimultaneous existence of means). (Memorandum, pp. 203-211.) The rationale of the Court's theory of noninfringement (Memorandum, pp. 212-213) -- only method claims rather than machine claims can be infringed by a new use of an old general-purpose computer, Section 100(b) -- was not specifically argued by defendants.

Defendants' complaint about plaintiff dropping claims 1-19 at the commencement of trial is unfair. In the first place, because of the unavailability of one of defendants' technical experts, infringement discovery was not completed until just before then. (Yuter affidavit, par. (9), Exhibits E1 and E2). More importantly, plaintiff believed that a credible argument of infringement of some data processing claims, especially claim 1, could have been made (see the arguable differences listed in Appendix 6, p. 5 of the Giardino Affidavit), but the risk of loss outweighed the additional trial time that would

have been required trying validity and infringement of a different invention. (Yuter affidavit, pars. (10) and (11))

As for the Westbury brochure, plaintiff is still of the opinion that it just outlined the hoped-for results and was insufficiently detailed to teach a skilled person to practice any of the claimed inventions. The Court's opinion to the contrary (apparently based on the judgment that there was no invention to begin with in achieving the desired results) does not detract from plaintiff's good faith belief and should not provide a basis for an award of attorneys fees. (Yuter affidavit, par. 13))

CONCLUSION

In order to justify an award of attorneys fees, defendants had to prove with a reasonable certainty deliberate misrepresentations on the part of the patentees. They have failed to do so. And both Timely Products and Kramer support the Court's findings and judgment on that issue.

Defendants' motion should be denied.

Respectfully submitted,

S. C. Yuter
Attorney for Plaintiff
Yuter & Rosen
605 Third Avenue
New York, N.Y. 10016
212-986-1221

New York, N.Y.
December 10, 1975

Of Counsel
Yuter & Rosen
Daniel M. Rosen

A1424

IN THE UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK

- x

DIGITRONICS CORPORATION, NOW AMPEREX ELECTRONIC CORPORATION,

Plaintiff,

v.

THE NEW YORK RACING ASSOCIATION, INC., AUTOMATIC TOTALISATORS (U.S.A.) LTD., AUTOMATIC TOTALISATORS LTD. and PREMIER EQUIPMENT PROPRIETARY LTD.,

Defendants.

Index No. 67 C 1119

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PLAINTIFF'S CLASSIFICATION DEFINITIONS OF CLASSES SEARCHED BY EXAMINER DURING PROSECUTION OF WEIDA ET AL. PATENT NO. 3,252,149 *

Class	Sub	Search Date	Definition	Classification Page
235	--	8/1/63 10/23/65	235. REGISTERS This class includes machines employed for ascertaining the number of movements of various devices or machines; ... also organized machines, such as, ... calculators having registering or counting devices as essential or important elements and having in addition certain other features necessary to make up the complete machines for the purposes desired. * * * In addition to registers per se, the class is sub-divided into various groups according to the functions of the machines classified therein.	PX179 235-1

* See attached copy of PX146A (PX2-131) for the classes searched.

Class	Sub	Search Date	Definition	Classification Page
				PX179
235	157	8/1/63	235. REGISTERS	235-1
		10/23/65	61. calculating machines	235-10
			150. electric information signals	235-17
			152. signals represent numerical digits	235-24
			156. perform complex arithmetical operations	235-24
			157. includes programming structure	235-24
				PX179
235	92RT	8/1/63	235. REGISTERS	235-1
			92. operated through medium of electrical devices	235-13
			RT Race Track (unofficial classification by Examiner)	
				PX179
235	153	8/1/63	235. REGISTERS	235-1
		10/23/65	61. calculating machines	235-10
			150. electric information signals	235-17
			151. connected to external device	235-22
			152. signals represent numerical digits	235-24
			153. test for error in results produced	235-24
340	--	8/1/63	340. COMMUNICATIONS, ELECTRICAL	
		10/23/65	This class is the residual home for subject matter, not elsewhere classified, relating to communication by means which are in part or in whole electrical.	PX180 340-1
				PX180
340	172.5	8/1/63	340. COMMUNICATIONS, ELECTRICAL	340-1
		10/23/65	147. means ... for controlling the operation of plural devices, said control being exercised over a lesser number of communication lines than the number of different results which can be obtained by signaling over said line	340-13
			172.5 system includes either a data processing system or an intelligence storage system	340-15
				PX179
235	92	10/23/65	235. REGISTERS	235-1
			92. operated through medium of electrical devices	235-13

A1426

Class	Sub	Search Date	Definition	Classification Page
				PX179
235	61.1	10/23/65	235. REGISTERS	235-1
			61. calculating machines	235-10
			61.6 controlled by the sensing or analyzing of data from a record	235-11
			61.1 combined with mechanism for punching the data set up or the results, or both	235-10
340	146.1	10/23/65	340. COMMUNICATIONS, ELECTRICAL	340-1
			146.1 having means for determining when signals indicative of intelligence, particularly in the form of a group, are transmitted or received without change and including means for correcting a determined change or error	340-13

Dated: New York, N.Y.
June 9, 1975

S. C. Yuter
Attorney for Plaintiff
Yuter & Rosen
605 Third Avenue
New York, N.Y. 10016
(212) 986-1221

A1427

January 15, 1970

George A. Smith, Esq.
Busser, Smith & Harding
2100 Girard Trust Building
Philadelphia, Pa. 19102

Re: Digitronics' Patent No. 3,252,149

Dear Mr. Smith:

Your letter of September 5, 1969 stated that you would be in touch with me in the near future concerning an explanation of the operation of the electromechanical totalisator systems used by American Totalisator.

Since you admit infringement of the second group of claims in the Digitronics totalisator patent No. 3,252,149 but deny validity, I believe that it is only fair that you provide us with the basis for your opinion as soon as possible so that we can make a decision concerning what action we should take in the absence of interest on the part of American Totalisator to accept a license.

Sincerely,

SCY:d
cc: Mr. R. W. Sonnenfeldt
Mr. M. Siegelbaum
R. G. Pelton, Esq.

BEST COPY AVAILABLE

P4-9

A1428

July 1, 1970

George A. Smith, Esq.,
Smith, Harding, Earley & Follmer
2100 Girard Trust Building
Philadelphia, Pa. 19102

Re: Digitronics' Patent No. 3,232,140

Dear Mr. Smith:

In reviewing the file I was disturbed to note that we have not yet received the promised explanation of the operation of the electro-mechanical totalisator systems used by American Totalisator, and presumably considered by you as prior art.

In view of the continued infringement of the subject patent by American Totalisator's Multi-Tote System, a prompt response is advisable.

Sincerely yours,

CC: Mr. Clifton W. Sink
Mr. M. Siegelbaum
R. G. Pelton, Esq.

P 501

OATH, POWER OF ATTORNEY, AND PETITION

Being duly sworn, we, Robert L. Weida, Edward M. Richards, Evelyn Berezin, Jack Knoll and Philip Rosenblatt, depose and say that we are respectively citizens of the United States of America, residing respectively at:

Whitestone, County of Queens, State of New York;
East Northport, County of Suffolk, State of New York;
New York City, County of New York, State of New York;
Plainview, County of Nassau, State of New York;
Mount Vernon, County of Westchester, State of New York;

that we have read the foregoing specification and claims and we verily believe we are the original, first, and joint inventors of the invention or discovery in "DATA PROCESSING SYSTEM" described and claimed therein; that we do not know and do not believe that this invention was ever known or used before our invention or discovery thereof, or patented or described in any printed publication in any country before our invention or discovery thereof, or more than one year prior to this application, or in public use or on sale in the United States for more than one year prior to this application; that this invention or discovery has not been patented in any country foreign to the United States on an application filed by us or our legal representatives or assigns more than twelve months before this application; and that no application for patent on this invention or discovery has been filed by us or our representatives or assigns in any county foreign to the United States.

And we hereby appoint S. C. Yuter, Registration No. 17,079, 485 Lexington Avenue, New York 17, New York, our attorney with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent Office connected therewith.

Wherefore we pray that Letters Patent be granted to us for the invention or discovery described and claimed in the foregoing specification and claims, and we hereby subscribe our names to the foregoing specification and claims, oath, power of attorney, and this petition, this 27th day of March 1963.

Inventor: Robert L. Weida

Post Office Address: 24-28 157th Street, Whitestone, New York.

Inventor: Edward M. Richards

Post Office Address: 30 Elton Drive, East Northport, New York.

68

PX 2-68

Hardware Digs. EX3 pr 2,
4/9/74 cj

A1430

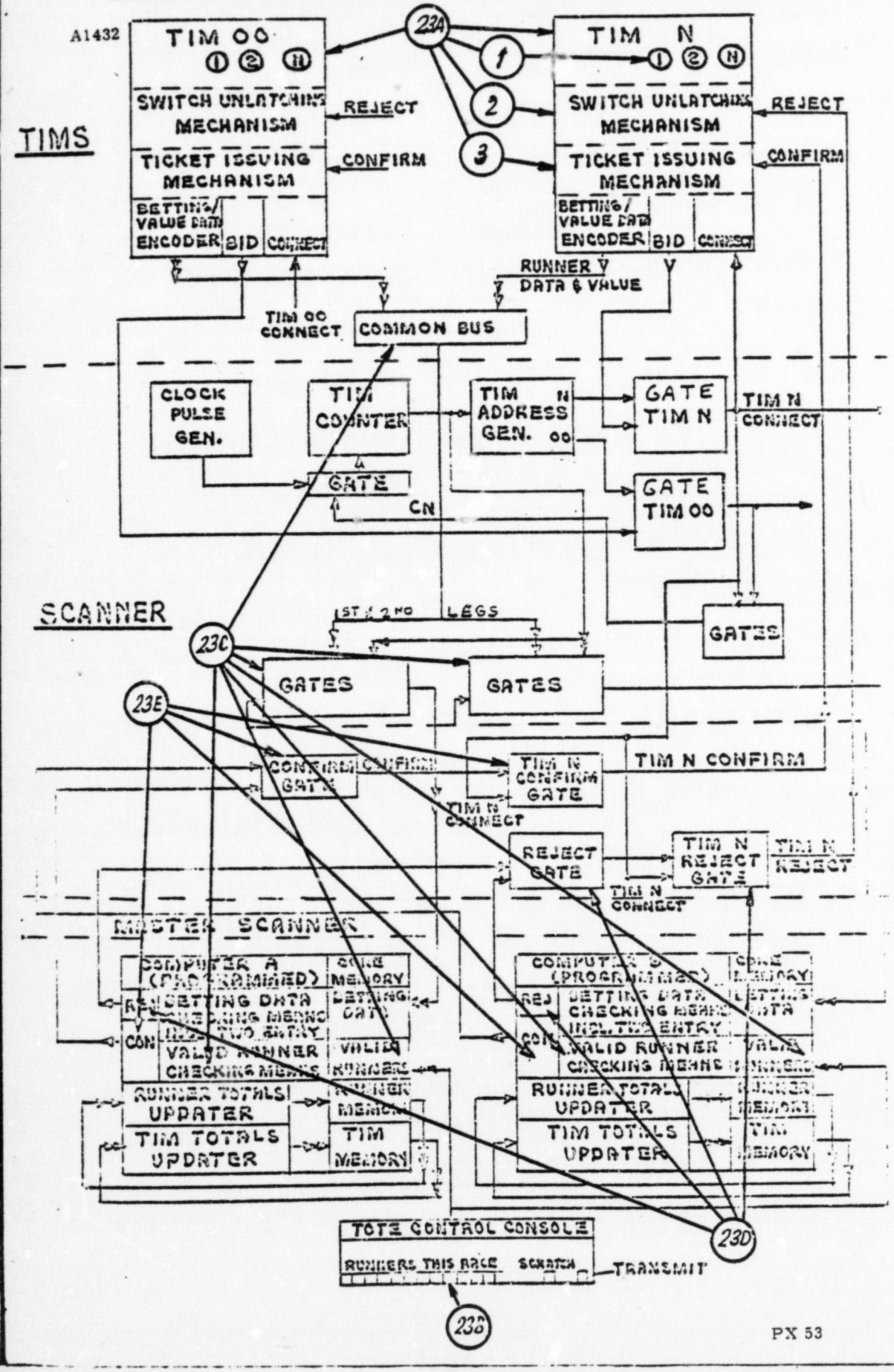
PX 50

THE PDP-8 ELECTRONIC TOTALISATOR SYSTEMS MANUAL

Hence, it can be seen that the principle of "The Check on the Check", .e. the ability to obtain vital information from several independent ources, has been carried through, in its entirety, to the Electronic otalisator. Due to the different type of equipment, the way in which t has been done is quite unique but the result is just the same in ompletely protecting the bettor and the operator against all possible ypes of equipment malfunctioning.

With an Electronic Totalisator all the equipment outside the machine oom is similar to the electromechanical system, and normal maintenance echniques apply. In the machine room, however, fresh techniques are equired on equipment which is similar to many computer installations. ersonnel required to maintain this equipment must still, of course, be horoughly steeped in tote philosophy. A new member has been added to he tote team. He is thoroughly versed in the micro and integrated circuits f modern electronics.

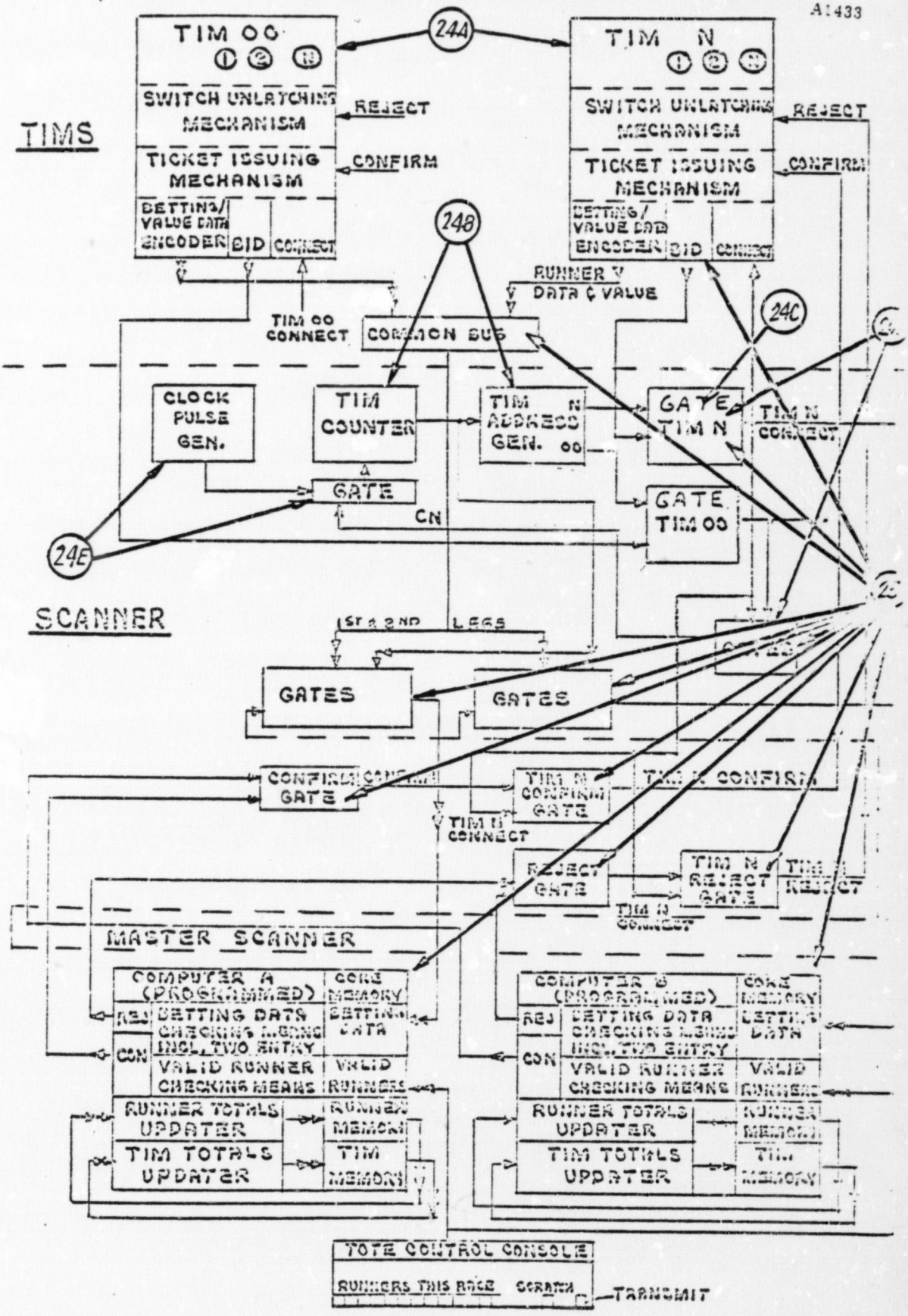
NYRA ELECTRONIC TOTALISATOR SYSTEM



PX 53

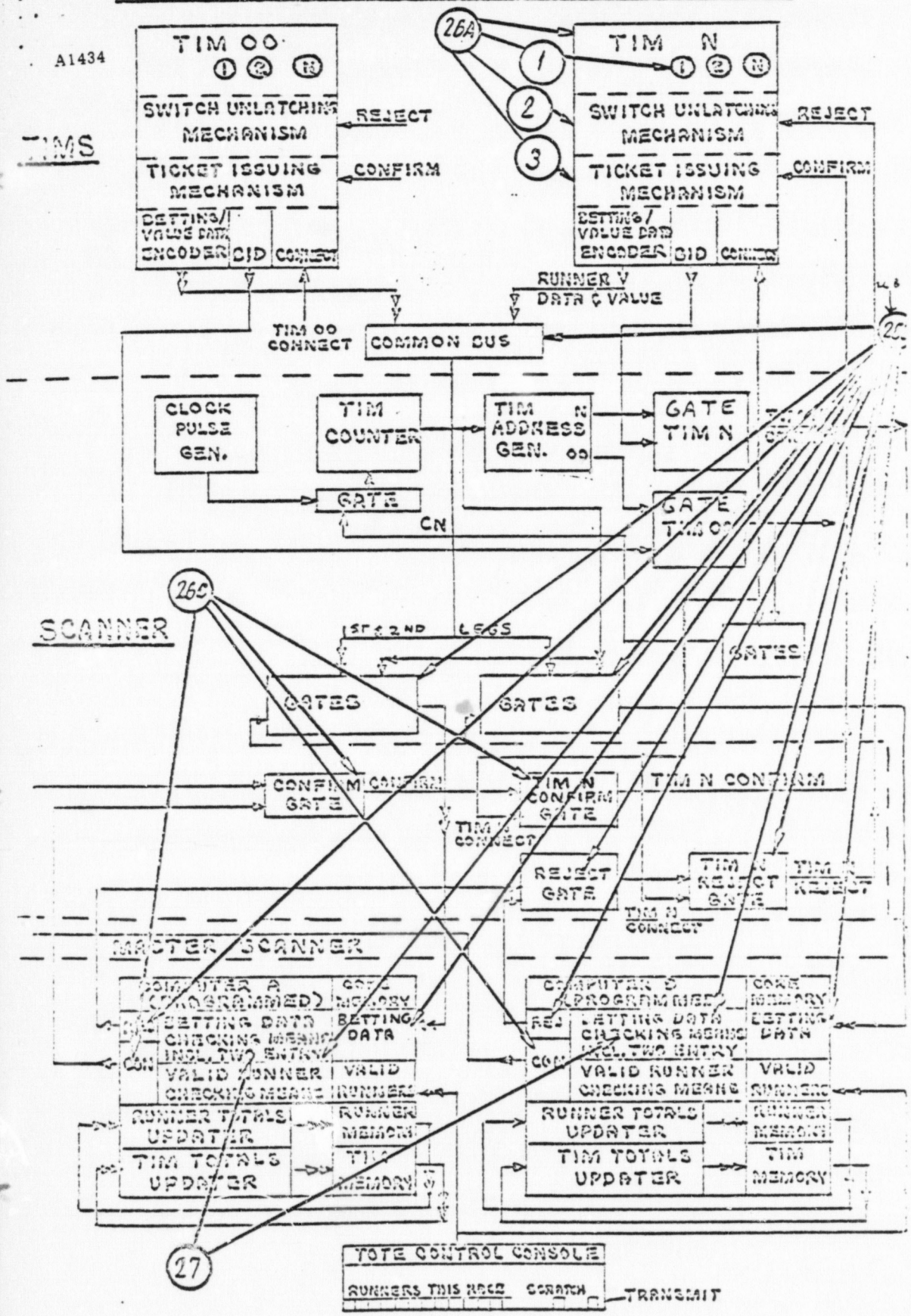
NYRA ELECTRONIC TOTALISATOR SYSTEM

A1433



PX 54

NYRA ELECTRONIC TOTALISATOR SYSTEM



T X57 ✓

A1435

THE

ELECTRONIC TOTALISATOR

using PDP-8 computers

AUTOMATIC TOTALISATORS (U.S.A.) LIMITED
Wilmington, Delaware

PX 57-3
f812

A1436

TYPE J11 TICKET ISSUING MACHINE

The Type J11 Ticket Issuing Machine is a fast, modern, lightweight, push button machine which has proved very reliable under all race track conditions.

Tickets are printed at the rate of 200 per minute, but in actual selling the rate is much less because of other factors. As the machine is so fast it creates no delay in selling. This feature makes it ideal for use with any Electronic Totalisator System.

The machine is equipped with a standard steel cover and a color coded pushbutton keyboard. This keyboard contains two rows of selector buttons plus the pool and test selector buttons. The upper row of number buttons is for the 1st Half Daily Double, (Perfecta or Quiniela) Selection and the lower row of number buttons is for the 2nd Half Daily Double (Perfecta or Quiniela) and for Win, Place and Show Pool Selection. To sell any ticket, two associated buttons have to be depressed.

In the design of this machine much thought was given to the rapid removal of the sub-assemblies, for servicing.

The Race Number and Code changing mechanism is automatically controlled from the computer, so this feature, coupled with the large rolls of ticket paper provided, allows the machine to remain locked during the whole of the racing period.

A metal cabinet of modern design is available for use with the J11 TIM. The TIM sits in runners on the top of this cabinet when it is installed at a track, and it fits in runners inside the cabinet for storage and transport.

The attached leaflet on the Type J11 Ticket Issuing Machine describes it in detail.

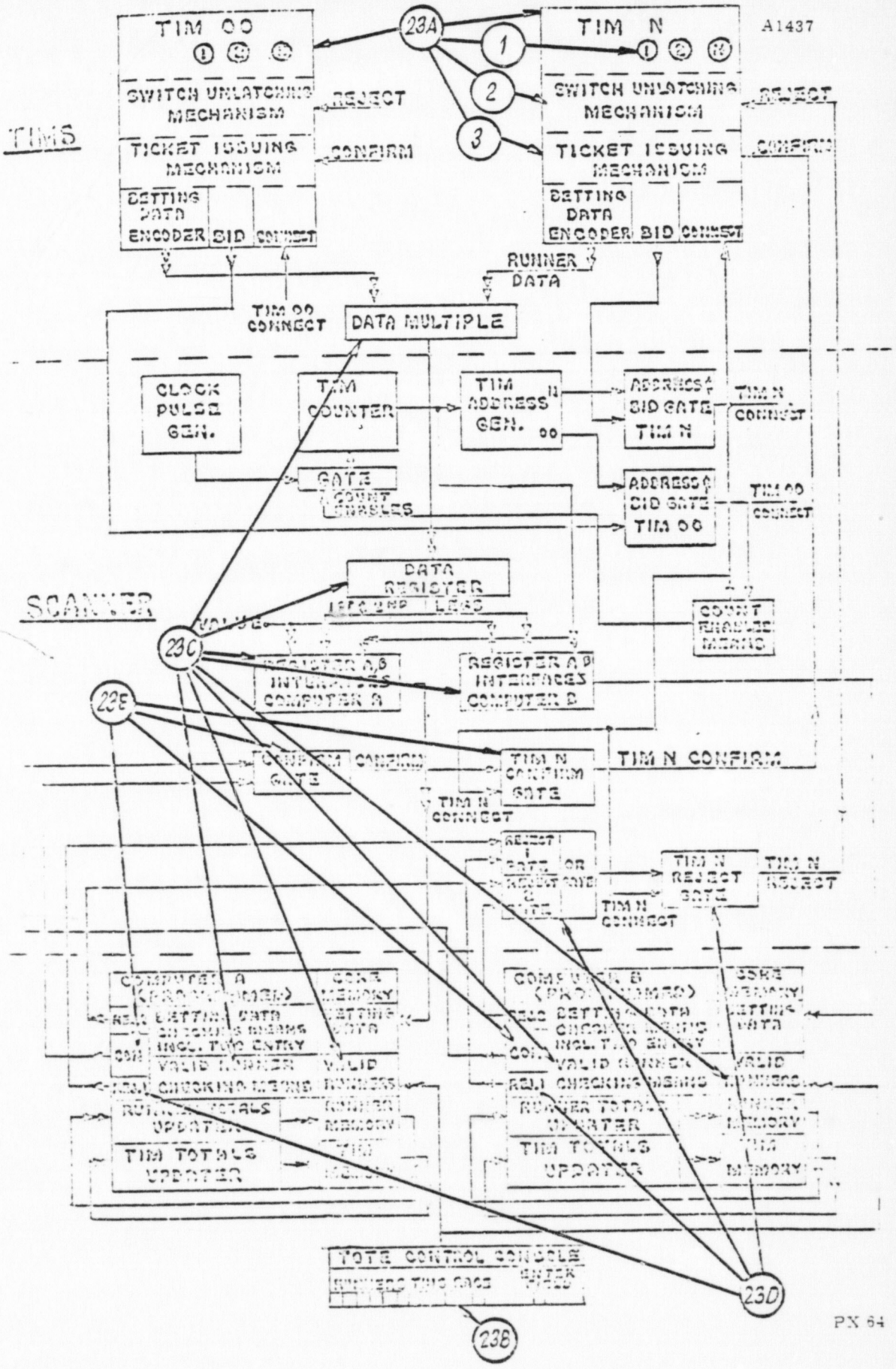
When the system is installed and fully operational, the procedure for selecting and issuing a ticket starts at a Selling Window. The TIM operator selects a bet by depressing a certain combination of keys on the TIM keyboard. A Bid Signal is sent to the TIM Scanner. The Scanner sends a request for service to the computers. The computers check the data in all respects and if valid, updates the appropriate totals in the computer, then gives a Confirm signal. This Confirm signal is sent back to the TIM and the ticket is then printed and issued. However, if the data is not valid, a Reject signal is given. This Reject signal is sent back to the TIM and the depressed buttons are released so a correct selection can be made.

This whole action takes place almost instantaneously and if the selection the Seller has made is correct a ticket is issued without any delay. If the selection the Seller has made is wrong, the depressed buttons reset immediately.

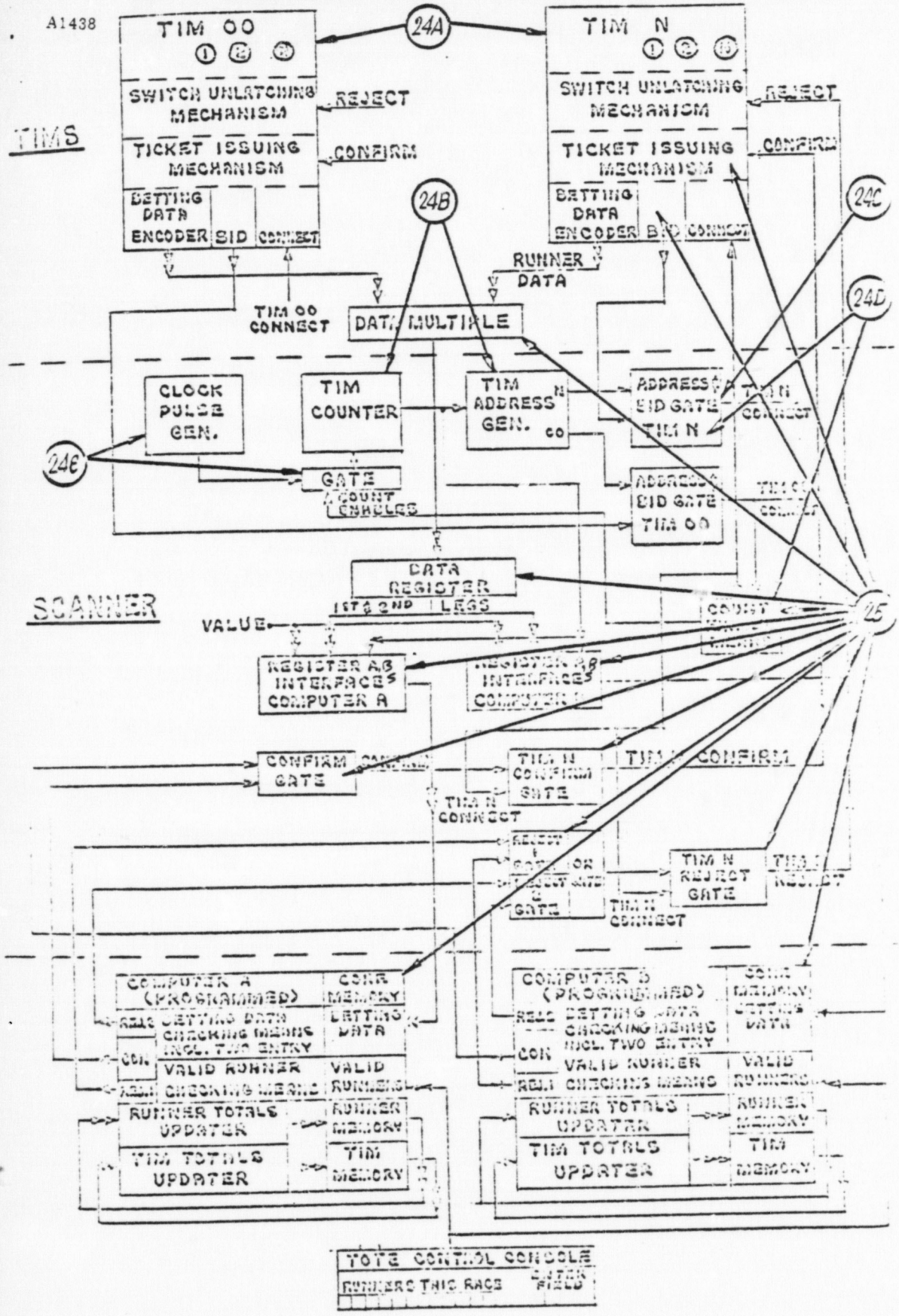
From the start of betting to the calculation of the payoffs, the whole operation is under the control of the Totalisator Control Console. Figure 3 shows a detailed layout of the keyboard of the Totalisator Control Console. From this keyboard all related race information, such as race number, post time, number of starters, date, results, etc., is keyed into the system. Provision is made for starting and stopping betting, selecting the pools which operate for each race, and for displaying odds, pools and payoffs. During betting, odds are periodically recomputed, the indicator boards updated, and the new line of odds is automatically printed out on the high speed printer. Both computers work in parallel, taking in the same information and performing the same calculations. At each interval, a check is made that they have both received the same information and that they have both done the same calculations. If there is any discrepancy an alarm is sounded and the malfunctioning computer is indicated. Nevertheless, the system can continue to operate on one computer — without interrupting service to the public — until the malfunctioning computer is corrected and again put into parallel operation.

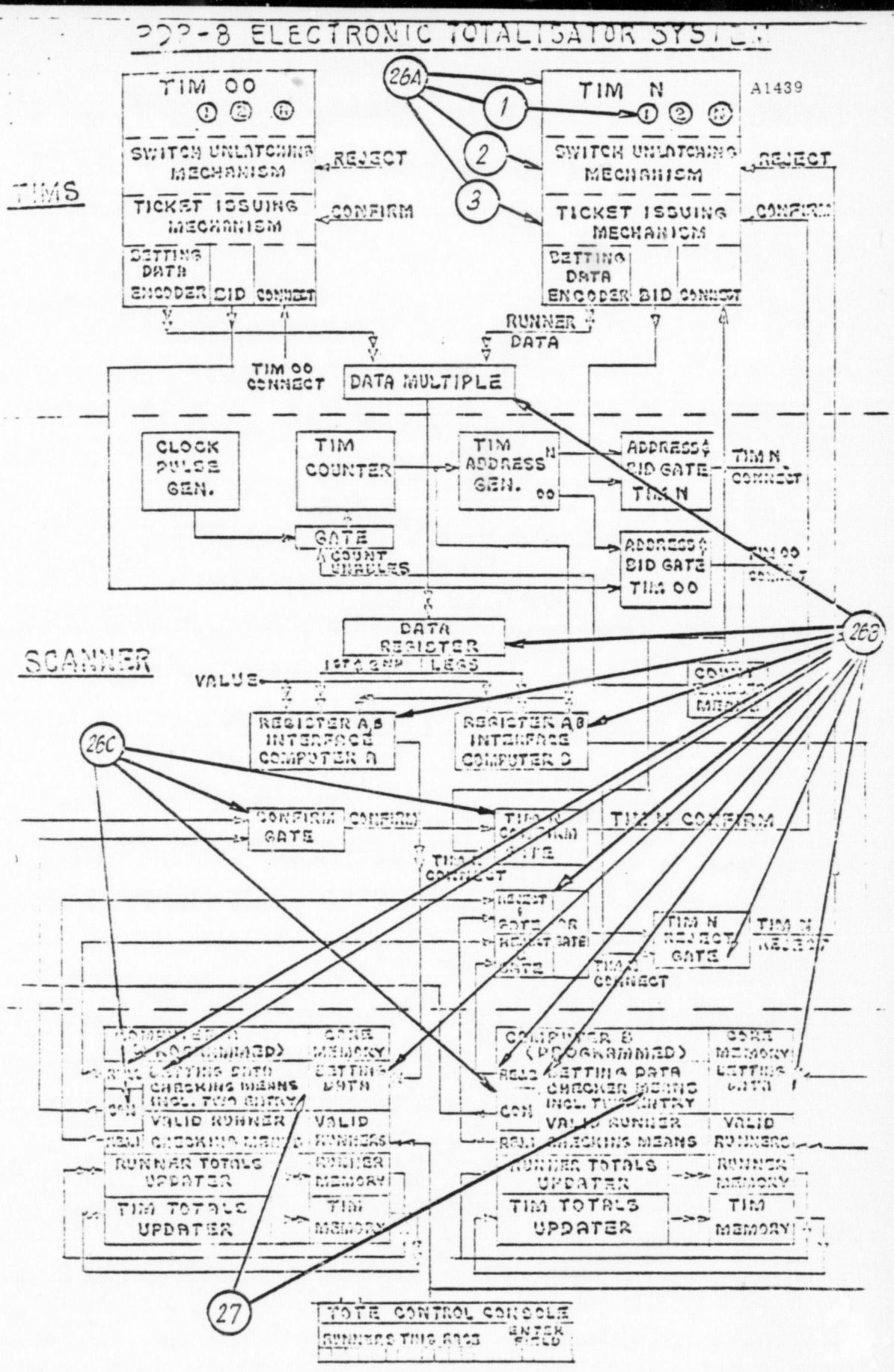
When betting stops the final state of the pools, the odds, total sales per TIM, plus ticket summary by value, are automatically printed out. When the results are declared official, the payoffs are computed and posted on the indicator boards and this information is automatically printed out.

POP-8 ELECTRONIC TOTALISATOR SYSTEM



A1438


TIMS
TIM 00
SWITCH UNLATCHING MECHANISM
REJECT
TICKET ISSUING MECHANISM
CONFIRM
BETTING DATA ENCODER
SID
CONNECT
24A
TIM N
24B
24C
24D
24E
RUNNER DATA
TIM 00 CONNECT
DATA MULTIPLE
CLOCK PULSE GEN.
TIM COUNTER
TIM ADDRESS GEN.
ADDRESS SID GATE TIM N
ADDRESS SID GATE TIM 00
GATE
COUNT ENABLES
SCANNER
DATA REGISTER
1ST & 2ND LEGS
VALUE
25
REGISTER AB INTERFACES COMPUTER A
CONFIRM GATE
TIM N CONFIRM GATE
TIM N CONNECT
TIM N REJECT GATE
COMPUTER A (PROGRAMMED)
CORE MEMORY
BETTING DATA CHECKING MEANS INCL. TWO ENTRY
BETTING DATA
VALID RUNNER CHECKING MEANS
VALID RUNNERS
RUNNER TOTALS UPDATER
RUNNER MEMORY
TIM TOTALS UPDATER
TIM MEMORY
COMPUTER B (PROGRAMMED)
TOTE CONTROL CONSOLE
RUNNERS THIS RACE
ENTER FIELD


PDP-8 ELECTRONIC TOTALISATOR SYSTEM
A1439
TIMS
TIM 00
SWITCH UNLATCHING MECHANISM
TICKET ISSUING MECHANISM
BETTING DATA ENCODER
BID CONNECT
REJECT
CONFIRM
26A
1
2
3
TIM N
RUNNER DATA
TIM 00 CONNECT
DATA MULTIPLE
CLOCK PULSE GEN.
TIM COUNTER
TIM ADDRESS GEN.
ADDRESS BID GATE TIM N
TIM N CONNECT
GATE
COUNT ENABLES
ADDRESS BID GATE TIM 00
26B
SCANNER
DATA REGISTER
VALUE
REGISTER A/B INTERFACE COMPUTER A
REGISTER A/B INTERFACE COMPUTER B
26C
CONFIRM GATE
TIM N CONFIRM
REJECT
TIM N REJECT GATE
COMPUTER A (PROGRAMMED)
CORE MEMORY
BETTING DATA CHECKING MEANS INCL. TWO ENTRY
VALID RUNNER CHECKING MEANS
VALID RUNNERS
RUNNER TOTALS UPDATER
RUNNER MEMORY
TIM TOTALS UPDATER
TIM MEMORY
COMPUTER B (PROGRAMMED)
27
TOTE CONTROL CONSOLE
RUNNERS TIME BASE
ENTER FIELD

WESTERN TOTALISATOR CO., LTD.
BOX 413
WALDEN, NEW YORK

A1440

REGISTERED OFFICE
670 HOWE STREET
SUITE 212
VANCOUVER, B.C.
CANADA

TELEPHONE
PRESCOTT 4-4500

May 22, 1961

Mr. Albert A. Auerbach, President
Digitronics Corporation
One Albertson Avenue
Albertson, L.I., N. Y.

Dear Albert:

Today I arranged to ship to Digitronics Corporation one of our ticket issuing machines. I had initially planned to ship one of our newest machines, but instead have shipped you a machine that was manufactured in 1939.

I have shipped our T.I.M. to Digitronics as a sample which must be returned within one year. This shipping formula will dispense with the usual customs formalities involved when any shipment arrives from out of the country.

Our T.I.M.'s operate on 48 to 50 volts DC. When this machine arrives at your plant, I will gladly come to your plant and tie it in for you and acquaint you with some of the features of the machine that have attributed to it's great success throughout the world.

The T.I.M. that I have sent you does not incorporate a printed take-off. However, I have a printed take-off here at home and will send one of our imperts to install same in our T.I.M. when it arrives at your plant.

The purpose of sending our oldest T.I.M. is so you could observe the wear and tear that this machine has endured down through the years, and it is still a serviceable T.I.M. The original patent on this machine was issued in 1926.

The radical difference between our T.I.M. and yours is that your horse selector cam and sensing unit are constantly rotating, which I can appreciate as being necessary, for in your particular circuit as long as the horse selector cam and sensing unit are rotating, your circuit is open and waiting for the next operation.

Please accept my many thanks for demonstrating your electronic totalisator. During the demonstration, I recognized a bit of uneasiness and reluctance to acquaint me with your circuit. If, in the future, I should visit your plant again, please be advised that I am not interested in your circuit for any purpose other than possibly being a prospective customer some day.

One of the great drawbacks in the totalisator business is the lack of suppliers. Down through the years, supply has been pretty well controlled by you know who. Any interest that I may have in your circuit would most certainly not be for the intent of manufacturing equipment. Suppliers are harder to get than customers.

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PX 111

A1441

WESTERN TOTALISATOR CO., LTD.

BOX 418
WALDEN, NEW YORK

REGISTERED OFFICE
678 HOWE STREET
SUITE 212
VANCOUVER, B.C.
CANADA

TELEPHONE
PRESCOTT 4-4500

May 22, 1961

Mr. Albert A. Auerback

Continued

Your circuit, like most electronic circuits, is not likely to be patentable and follows the usual electronic computer intricacies. We could be a beneficial critic, and if Western becomes interested in your equipment, our critical comments would be in our own best interests.

Thanks again for the demonstration, and please do not hesitate to call on me to assist you in a demonstration of our T. I. M. when it arrives at your plant.

Sincerely,

JOSEPH G. LEASE

JGL:k

cc:m Mr. Alvin Weil

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A1442

TO: L.M. Walger, Mutuel Director

December 14, 1966

FROM: R.W. McElfresh

SUBJECT: Annual Report on the NYRA Tote System

The NYRA Totalisator System performed as designed during the first year of operation. The FASTOT program had minor bugs in it which were cleared up during the year. There were many modifications made to the program to incorporate additional automatic checking to protect the system against the possibility of being disabled by a human error or a hardware failure. The various hardware components were not without their problems. These problems decreased as the season progressed and experience was acquired by the service personnel. Many of these problems were of a minor nature and only meant time spent by the operators on work of a detailed nature. The public was serviced by the system in a fast and most efficient manner.

Below is listed the major system failures during the year of 1966, showing the date, cause, reverberations and finally the steps taken to protect the system from a future failure of that type.

1. On April 3rd, a human error caused an on line computer operating in a simplex mode to be powered down. The operating crew was able to start up the previously bad computer and continue betting with no appreciable loss of betting time. However, transactions were lost and the race had to be recalculated to adjust the revenue to the State. The prices were not effected and the public was unaware of what had happened. The remedy was all unauthorized personnel were restricted from the operator's area.

2. On April 23rd, a human error occurred when the power switch on System C was thrown off and the scanners were powered down. This resulted in a loss of betting time of approximately 12 minutes for Race 9. However, post time was extended and the public was not shutout. Warning lights were installed on the power switches to warn the operators when power was off and locks were put on master switches.

3. On July 27th, another human error occurred when the operators failed to insert all the runners in the 4th race. There was a 25 minute delay on open betting, post time was extended and there was no loss of revenue. A procedure has been set up which will allow the supervisor of the tote system to alter memory to allow the operators to re-insert a runner which has been left out by error.

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4. On September 3rd a faulty tim scanner caused all 12 tim scanners to hang up 3 minutes before post time for race 8. This resulted in a loss of handle. The problem which caused this was located and corrected.

5. On October 5th due to a faulty generator in the utility power supply A betting on the 6th race was held for 9 minutes. An extension of post time was obtained and there was no handle loss due to the mishap. The generator was repaired.

6. On November 30th a human error in creating library tapes caused a 47 minute delay in open betting on race 2 and a 20 minute delay in posting prices for race 1. The public was inconvenienced by the delay but no handle was lost. THE FASTOT program and associated system programs are being modified to protect the system against the possibility of mounting an improper library tape.

Floater tickets issued without being registered on the computer or on the tim counter created quite a problem during the early part of the year. As of October 1, 1966 this problem has been brought under control by the modification of the tim counter circuit. Now any mis-issued tickets are registered on the tim counter.

Mis-selections, of which there were some 20 cases this year, has been eliminated from the system by changing the runner and type codes from 4 to 2 bits. This was accomplished by modifying the printed circuit cards in the tims and revising the FASTOT program. Version 6A1 of the FASTOT program was tested and put on line on December 5, 1966.

The elimination of mis-selections will in turn cut down on the number of overpays to a great degree.

Over registrations have been a major flaw in the system and has cost the operators, ATL, considerable money. However, there are proposed modifications in the making to verify sales being issued by the tim before the computer can issue another confirm. If this is tested successfully during the off season we will have licked the problem. We are very optimistic that come next season we will not be confronted with over registrations.

This completes my first annual report on the NYRA Tote System and in closing I would like to give credit to the computer operators, the Honeywell service engineers, the tim servicemen and the ATL Project Engineers. They have done a remarkable job in operating and servicing the system for us. Based on the valuable experience they have gained in this year, I look forward to an improved operation during the coming year.

R. W. Ingerfield